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W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXIII

January 4 and 11, 1930

No. 1

San Antonio

Meteorological data were recorded as follows during the two-week period ending December 28:

Week ending	Temperature					G. D. R.	Pre- cipita- tion	Aspect of the sky		
	Maximum		Minimum		Mean			Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
Dec. 21	78	54.1	10	33.3	43.7	40	.28	1	4	2
" 28	68	59.7	13	27.9	43.8	37	Tr.	4	3	0

An unusual storm struck this section and most of the State on the 20th. During the afternoon of the 20th a heavy mist fell, increasing towards evening. Temperatures dropped rapidly and the mist changed to sleet in the late evening. About midnight the sleet changed to snow, which fell continuously until noon of the 21st. Only 1-3/4 inches of snow was recorded at the station, although the Weather Bureau office in San Antonio recorded 2.8 inches. Record snows were reported over most of Texas. This is the first snow at the station since January 1926. The minimum temperature of 10° occurred the morning of the 22d and is the second lowest temperature ever recorded at the station, the record being a minimum of 9° in January 1918.

Considerable damage resulted from the extreme cold weather. Oats in the rotations were badly frozen, and it may become necessary to re-plant. The small grain variety test was not injured nearly so much as the oats in the rotations. Pastures were frozen back but are recovering. Field peas for green manure in the rotations were killed to the ground and the stand will be thinned considerably. Many of the ornamentals which are considered fully hardy in this section suffered severely. The leaves of Ligustrum ovalifolium (California privet) were all killed, while various plants of L. japonica (Japanese privet) lost from 25 per cent to 100 per cent of their leaves. Of the palms on the station grounds only Sabal texana, S. palmetto, Inodes exul, and Erythea armata survived the freeze with little or no damage. Such palms as Sabal un-braculifera and Phoenix canariensis suffered the loss of all leaves. The extent of damage to Athel (Tamarix articulata) and citrus species has not yet been determined, but they have at least lost all foliage and more tender wood, even including Eusk citrange, which has gone through other winters with practically no injury. Very meager information as to the extent of the damage done to citrus plantings in the regions south of San Antonio has been available.

Activities of the station during the period consisted of sawing wood, plowing the Herbst tract, disking and harrowing C-3 in preparation for flax, plumbing made necessary by the freeze, and miscellaneous work about the station during the inclement weather.

The moisture samples have been reweighed, and yields of sorghum for forage in the rotation and tillage experiments are given in the following table.

3,333 1/3

1,111

San Antonio (cont'd)Yields of Sorghum for Forage, Rotation and Tillage
Experiments, 1929

Rotation	Rank	Yield	Treatment
		Tons per plot	
Sorghum in 4.1' rows			
A4-E	2	4.52	Sorghum, plowed Nov.; fallow.
A6-4	5	3.13	Sorghum continuously, plowed Nov.
B5-5	3	3.74	Sorghum continuously, plowed Nov.
B5-A	1	4.96	Sorghum, plowed Nov.; cotton, plowed Nov.
B5-C	4	3.57	Sorghum, plowed Nov.; corn, plowed July.
Average		3.98	
Sorghum in 8" drills			
A4-F	5	4.37	Sorghum, plowed Nov.; cotton, plowed fall; oats, plowed June; Milo, field peas, plowed spring.
A4-G	7	3.72	Sorghum, plowed Nov.; cotton, plowed fall; oats, plowed June; milo, field peas for hay, plowed spring.
B4-12	2	6.11	Sorghum continuously, manure, plowed Nov.
B4-13	3	5.29	Sorghum continuously, manure alternate years, plowed Nov.
B5- 6	6	4.28	Sorghum continuously, plowed Nov.
B5- B	1	6.23	Sorghum, plowed Nov.; cotton, plowed Nov.
B5- D	4	4.46	Sorghum, plowed Nov.; corn, plowed July.
Average		4.92	
Sudan grass			
A6- F	2	4.35	Sudan grass, manure, plowed Nov.; corn, plowed July.
B4- A	1	4.87	Sudan grass, plowed Nov.; cotton, plowed Nov.; milo, plowed July.
Average		4.61	

Report for the two-week period ending January 11 and summary for December, 1929.

	Month of Dec. 1929	Week ending		Mean 1909-1928
		Jan. 4, 1930	Jan. 11, 1930	
Temperature:				
Absolute maximum	81	76	75	---
Mean maximum	64.4	65.9	52.7	---
Absolute minimum	10	32	27	---
Mean minimum ...	38.7	37.4	36.3	---
Mean	51.5	51.6	44.5	51.4
Greatest daily range	40	36	30	---
Precipitation (inches)	1.81	.02	.36	1.82
Aspect of the sky:				
Days clear	15	3	0	----
Days partly cloudy	12	3	1	----
Days cloudy	4	1	6	----
Mean wind velocity, (m.p.h.) ...	2.9	---	---	3.1
Evaporation (inches)	1.59	---	---	2.46

San Antonio (cont'd)

The weather of December was very close to the mean of the past 22 years in all respects. The cold weather the last of November continued through the first few days of December. Following this, very mild weather prevailed for about ten days, and pastures made good growth. Starting on the 20th of the month a severe "norther" occurred accompanied by a three-inch snow and a minimum temperature of 10, the second lowest temperature ever recorded at this station. This freeze killed field peas to the ground and injured oats in the rotations and pastures. There was also considerable injury of palms and other plants.

The weather of January to date has been largely cloudy with frequent showers and mists. Temperatures have not been very severe. Oats are recovering rather slowly but field peas have made practically no recovery since the December freeze.

During the favorable weather of the last week in December and the first few days in January the ground was prepared, and the flax nursery, variety test, and first planting in the date-of-seeding flax test were planted.

Several days were spent in repairing and building the farm road below the orchards A-3 and B-3 to prevent washing during overflows.

Fallow plots in the rotations and in field C-5, as well as other plots needing cultivation, were disked with the tractor disk. The remainder of field C-6 was plowed.

Numerous repair jobs and miscellaneous work in the greenhouse and about the farm buildings occupied the remainder of the time.

Mr. C. J. King, Agronomist, Office of Cotton, Rubber, and Other Tropical Plants, was a station visitor on January 11.

I. M. Atkins.

Scotts Bluff

December was unusually pleasant. The maximum temperature was 65 and the minimum 7 below zero. No precipitation was recorded.

While December was mild, the month of November was very bad. Many times during November the ground was frozen so that sugar beets could not be pulled. Then it would thaw so that digging could be resumed only to freeze up again in a few days. At one time it looked as if half of the sugar beet crop would be lost. During the first half of December the ground again thawed so that most of the sugar beets were harvested. It is estimated that about 400 acres still remain unharvested. The seven sugar factories of the valley are just closing their campaign.

The livestock is doing well. The thirteen lots of lambs are now on full feed. Our feeders' day will be held on April 3. The five lots of steer calves on winter rations are also doing fine. With the high price of eggs the poultry is giving a good account of itself. The dairy outlook is not so bright. With butter-fat down to 26 cents per pound the dairyman is not at all happy.

It is estimated that 485,000 lambs are now on feed in the Valley. This is an increase over last year. Shipments to market are just beginning. It is stated that most lambs going to market now are showing a loss. The price of fat lambs is about the same as was paid for feeders. No one seems to be optimistic about the future of the lamb market.

Scotts Bluff (cont'd)

The Superintendent returned from Washington, D. C., on January 3.

During the week ending January 11 the maximum temperature was 62 and the minimum 12 below zero. There was .01 inch of precipitation in the form of snow. Beginning Monday morning it has been real winter weather. Every night the temperature has dropped below zero, the maximum being 20. This is the coldest spell we have had this winter.

The livestock continue to do well. On Thursday 26 hogs were sold at \$8.90 per hundredweight. On Friday 49 head of coming 2-year old Hereford steers and some cattle from the dairy herd were shipped. These are the steers that were used in the dry lot wintering and summer pasturing experiment, which closed last fall. They have been fed beet tops and hay since the close of the pasturing season.

James A. Holden.

Yuma

The maximum temperature for the two-week period ending January 11 was 76, minimum 26, greatest daily range 43, and precipitation .14 inch.

The meteorological data for the month of December are as follows: Mean maximum 76.1, mean minimum 38.9, maximum 85, and minimum 29. No precipitation was recorded. Killing frosts occurred on the 23d, 24th, and 25th of the month.

During the past week 852 bales of cotton were ginned in the Yuma Valley. The total amount of cotton ginned this season is now 31,061 bales.

Most of the plowing in the rotation plots has been completed. The young alfalfa is coming up very nicely. Except for a few plots that followed cotton, all the barley plots in the rotations are in good condition.

The seed cotton yields from the new set of irrigated rotations that were started in 1928 are given in the following table.

Summary of seed cotton yields in new irrigated rotations,
1928 and 1929

Rotation No.	Yields of seed cotton per acre			Rank
	1928	1929	Average	
	Pounds	Pounds	Pounds	
7-A	1,580	1,726	1,653	13
7-B	1,808	1,468	1,638	14
31	1,324	1,500	1,412	15
34	1,992	2,410	2,201	1
34	1,996	1,514	1,755	8
36	2,024	2,156	2,090	2
36	2,160	1,546	1,853	7
54	1,996	1,990	1,993	3
54	1,972	1,782	1,877	6
56	2,028	1,816	1,922	5
64	2,040	1,860	1,950	4
64	1,784	1,604	1,694	11

(table concluded on next page)

Yuma (cont'd)

Rotation No.	Yields of seed cotton per acre			Rank
	1928	1929	Average	
	Pounds	Pounds	Pounds	
64	1,904	1,412	1,658	12
65	2,076	1,346	1,711	9
65	1,944	1,474	1,708	10

Maximum	2,160	2,410	---	---
Minimum	1,324	1,346	---	---
Average	1,909	1,707	1,808	---

A summary of the seed cotton yields in the old rotations is given in the following table.

Seed cotton yields in old irrigated rotations, 1923 to 1929

Rotation No.	Yields of seed cotton per acre, pounds								Rank
	1923	1924	1925	1926	1927	1928	1929	Average	
4	764	784	1,272	1,674	1,038	1,272	1,058	1,123	15
5	1,252	956	2,552	2,428	1,722	1,804	2,040	1,822	1
6	728	800	996	1,470	734	1,188	918	976	18
7	744	600	1,016	1,440	778	1,124	1,180	983	17
20	644	824	1,964	1,278	1,586	720	1,642	1,237	11
22	636	592	1,144	1,076	850	668	1,154	874	20
23	844	1,032	1,416	1,900	1,172	1,188	1,206	1,251	10
30	456	280	1,032	1,044	664	988	696	737	21
40	884	784	2,596	2,758	1,146	872	1,940	1,569	4
40	772	520	852	2,359	1,504	944	1,038	1,141	14
44	1,008	2,136	1,848	1,979	1,624	2,136	1,512	1,749	2
44	980	984	2,268	1,624	1,056	1,044	1,830	1,398	6
46	1,244	1,144	1,104	1,992	1,614	1,260	1,114	1,353	9
50	728	672	1,116	1,460	840	1,192	1,352	1,051	16
52	684	808	2,680	1,846	922	1,100	1,450	1,356	8
60	688	904	1,100	1,717	1,466	1,164	1,144	1,169	13
60	420	600	948	1,554	842	1,424	1,042	976	19
61	672	832	1,632	2,044	2,026	1,876	1,722	1,543	5
61	792	708	984	1,462	1,160	1,940	1,602	1,235	12
63	1,064	1,948	1,630	2,490	1,864	1,584	1,436	1,721	3
63	732	1,072	1,620	1,790	1,280	1,620	1,632	1,392	7

Maximum	1,252	2,136	2,680	2,758	2,026	2,136	2,040	-----	---
Minimum	420	280	852	1,044	664	668	696	-----	---
Average	797	904	1,514	1,780	1,233	1,291	1,364	1,269	---

Rotation 5, which is a continuously cropped plot of cotton to which 12 tons of barnyard manure are applied alternate odd years, leads the group in yield.

It is interesting to note that the average yield of all the new rotations in 1928 and 1929 is 1,808 pounds of seed cotton. This is almost as high as the average yield of rotation 5, the highest yielding plot in the old rotations.

Arthur T. Bartel

W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII

January 18 and 25, 1930

No. 2

Belle Fourche

Report for the week ending January 18

The feeder lambs were weighed on January 14, the end of a 90-day feeding period. The average daily gain for this period was .24 of a pound as against .26 a year ago, using the same rations. They are now consuming 1.50 pounds of grain a day, and this will soon be increased to 1.75 pounds. It is expected that this feeding experiment will be completed on February 17 and that the lambs will be shipped to Sioux City that week. It is hoped that the lamb market will improve materially before that time.

The project Dairy Show is in progress at Nisland this week and will continue next week. There are some very fine cows on exhibition. Judging by the number of people in attendance, a great deal of interest is being taken in the show. Even with butterfat at the low price of 27 cents a pound, the cows are paying for their feed at a good price.

Beyer Aune.

Scotts Bluff

The weather during the week ending January 18 was very severe. The maximum temperature was 12 and the minimum 37 below zero. This is the lowest temperature ever recorded at the station. Each night the temperature was below zero. For 13 consecutive days the temperature has gone below zero. The precipitation, which was snow, amounted to .14 inch of water. On the 18th there was a real blizzard all day.

The livestock in the feeding experiment are doing well. The 49 yearling feeder steers, which were shipped to Omaha, brought \$12 per hundredweight and averaged 865 pounds each.

The Superintendent has gone to Denver to attend the National Western Livestock Show and the meetings of the National Western Livestock Association.

Mr. Gunderson, Finance Secretary of the University of Nebraska, was at the station a couple of days checking over our books.

The weather continued very severe during the week ending January 25. The maximum temperature was 25 and the minimum 31 below zero. The warmest night was 2 degrees above zero. With this one exception, the temperature has gone below zero for the past 20 days. On the 20th there was .02 inch of precipitation in the form of snow.

The livestock in the feeding experiments continue to do well in spite of the cold weather.

The Superintendent has returned from Denver where he attended the National Western Livestock Show. While there he obtained a clerk, who will report for duty on February 10.

James A. Holden.

Yuma

The maximum temperature for the week ending January 18 was 69, minimum 29, greatest daily range 31, and precipitation 0.12 inch. The entire week was cold and disagreeable, three days being cloudy and four partly cloudy.

During the past week all the date palms on the station were inspected for scale, but none was found. The inspection of date palms will continue throughout the entire Yuma Valley.

One plot of vetch in the rotations has been rather severely attacked by aphids. This vetch is to be left for seed. All the plants have been sprayed twice with Black Leaf "40" and the aphids are now well under control.

Arthur T. Bartel

M I S C E L L A N E O U S

THE OCCURRENCE OF BORON ALONG THE
WEST SIDE OF THE SAN JOAQUIN VALLEY

Observations made during the past summer on the west side of the San Joaquin Valley have served to indicate the general outline of a boron area there of rather large proportions. As now recognized, this area extends on its eastern boundary from Newman, on the north, southeastward to the vicinity of Corcoran, a distance of approximately 150 miles. On the basis of late season plant symptoms and results obtained from the water analyses, it appears safe to conclude that at least the greater number of all the irrigation wells between the Coast Range and this eastern boundary line contain toxic quantities of boron. The area varies irregularly in breadth, from approximately 5 miles at Newman to 25 or more miles at the southern end.

It is possible that wells to the north of Newman may contain significant amounts of boron. The northernmost well sampled, No. 1955, contained .98 p.p.m.*

The southern end of the area appears to cross the dry bed of Old Tulare Lake several miles south of Corcoran. A number of samples were taken in the lake bottom, and of these No. 1847, the southernmost sample, contained .27 p.p.m. of boron. Sample No. 1846, from the east side of the lake, contained .49 p.p.m.; sample No. 1848, from the center of the lake, contained .46 p.p.m.; and sample No. 1849, from the west side of the lake, contained .91 p.p.m. of boron. The latter three samples were all collected slightly north of the sample No. 1847, which had .27 p.p.m. of boron. Analyses of water samples from wells at Smyrna, No. 1839; at Alpaugh, No. 1840; and at Angiola, No. 1841 and No. 1842, all contained less than .15 p.p.m. of boron. These towns are, respectively, 24, 16, and 8 miles south and a little east of Corcoran.

The eastern limit of the portion of the boron area from Hanford to Mendota has not been finally determined. In all, eleven samples, No. 1859 to No. 1868 and No. 1871, were taken along this line. With the exception of the two wells in Hanford, the lowest sample of the series contained .78 p.p.m. of boron and the highest, which was from the Stimson Irrigation District, contained 1.30 p.p.m. It seems probable, therefore, that some of the wells to the east of this line contain toxic amounts of boron. A sample from a shallow well along the White's Bridge Highway, 12 miles east of Mendota, contained but .04 p.p.m. Of the two samples collected in Hanford, one, No. 1859, taken from a well near the center of town, contained .66 p.p.m. of boron; and the other, No. 1860, taken from a well a mile north, contained .13 p.p.m. It may be noted in this connection that a marked difference was observed in the severity of the boron symptoms in the two portions of the city. Each of the two wells is perforated below 600 feet. Well No. 1859 was drilled to 900 feet and well No. 1860 to 1500 feet. The water stands at about 40 feet in each.

The San Joaquin River flows from the Sierra Nevadas in a southwesterly direction to Mendota and there turns northwestward. At this bend a diversion dam is located. The Fresno Slough enters the San Joaquin just above the dam and serves as a storage reservoir. The

*p.p.m. == parts per million.

The Occurrence of Boron, etc. (cont'd)

slough extends southeastward from Mendota for approximately 30 miles. At times water is derived from the Kings River through a by-pass into the slough. The canals supplied with water from the dam at Mendota serve lands on the west side of the river as far north as Crows Landing, a distance of some 60 miles. Marked symptoms of boron injury were noted in this area, which is supplied by gravity water from the San Joaquin River and the slough. Observations bearing on this portion of the valley will be discussed in a later part of the paper.

Area South and West of Mendota

The area outside of the canals and extending for a considerable distance west from Mendota, to the south and southeast, and into the old bed of Tulare Lake, obtains its water almost exclusively from wells. A number of wells are used for irrigation in the vicinity of Hanford and Lemoore, but a considerable amount of Kings River water is also used in that locality. The Kings River does not contain toxic quantities of boron.

The irrigation wells in the area just mentioned are deep. Some are less than 500 feet and a considerable number vary between 500 and 1000 feet, but many of them are drilled to 1500 feet and deeper. In these deeper wells the water ordinarily rises to within 100 or 150 feet of the surface.

In the vicinity of Mendota there is a considerable acreage of grapes, a small acreage of asparagus, and some fruit is grown. Throughout the area as a whole, except for the Kings River area near Hanford and Lemoore, the staple crops are cotton and winter grain. The eastern portion of the area is relatively old, whereas the remainder is of comparatively recent development and new wells are being put down. The deeper wells are largely to be found on the more recently developed lands. By no means all of the area to the south of Mendota is under cultivation.

The western side of the valley presents a broad expanse of level land, the topography of which is almost unbroken. The native vegetation, principally grass, is extremely sparse and trails or highways are unessential in many sections for travel by automobile.

The Mendota portion of the area was first visited in a boron-minded way on June 22, 1929. Even at this early date boron symptoms, which become more evident as the season progresses, were quite pronounced. On the basis of plant symptoms, it appeared then that excessive quantities of both salt and boron were being applied to the land in the irrigation waters. In Township 14 S, Range 14 E, a water sample was obtained, No. 1372, for which subsequent analyses indicated a conductance of 580 (3500 p.p.m. of salt, approximately) and a boron content of 1.47 p.p.m. A second sample, No. 1373, was obtained 14 miles south of Mendota and 3 miles east. This contained 1.88 p.p.m. of boron and had a conductance of 140. The next sample was collected 42 miles south of Mendota and 18 miles east. This sample, No. 1374, contained 1.00 p.p.m. of boron and had a conductance of 95.

The latter sample was taken from a well at the headquarters of a 42,000 acre ranch. This ranch, which was developed during the war, was at first farmed to grain. Later extensive acreages of deciduous fruits and grapes were planted. These orchards were from selected

The Occurrence of Boron, etc. (cont'd)

nursery stocks, and they were planted with great care. It is reported that when the orchards were set out one could look down rows of trees extending in unbroken lines from one section into the next. When the ranch was visited on June 22 of last summer the last of the orchards had been pulled out. Except for a small planting of mixed trees and grapes near the headquarters, winter grain was the only crop grown. It is reported that the fruit venture had represented an expenditure of six million dollars.

After obtaining permission, a water sample was secured from the only well then operating; and the small mixed planting near the superintendent's home was examined. A number of these plants exhibited boron symptoms of an almost unmistakable character and of a severity which is ordinarily to be expected only much later in the season. A series of water samples collected by the University on this ranch in 1925 for ordinary analyses showed the total solid content from 12 different wells to range between 654 and 1080 p.p.m.

The next water sample collected on this trip, No. 1375, was taken from the city water supply in Lemoore. Lemoore is 16 miles northeast of the ranch just referred to. This sample contained .67 p.p.m. of boron, which corresponds to a previous determination, No. 1117, of .78 p.p.m. The latter sample was delivered to the Limoneira Laboratory with the statement that the water was unusually soft and that black alkali indications had been observed to follow its use. At the time sample No. 1375 was collected no boron symptoms were recognized. The chief source of agricultural water in the vicinity of Lemoore, as at Hanford, is gravity water from the Kings River. A sample, No. 1376, from a shallow well in Lemoore, contained .31 p.p.m. of boron; and the canal water, No. 1377, contained .05 p.p.m. of boron.

A second series of observations were made in this region during the last week in September, at which time water samples Nos. 1839 to 1879 were collected. On this survey Mr. Wilcox accompanied me. It is somewhat difficult to discuss in detail a series of samples collected over so wide an area, without the aid of a large scale map. There are, however, a few sample groups which can well be referred to. The concordance between conclusions drawn on the basis of plant symptoms and subsequent water analyses are likewise of some interest.

As has already been noted, boron symptoms become more pronounced as the season progresses, and it is not difficult in the late summer to draw fairly accurate conclusions with respect to boron occurrence by leaf characters if boron is present in fairly large amounts. On the other hand, considerable caution must be used when only moderate injury is indicated. In the city of Bakersfield, for example, sycamore leaves were observed in early October which corresponded closely in their markings with sycamore leaves on one of the west side ranches in late June. A water sample collected from the city mains in Bakersfield, No. 1958, indicated but .23 p.p.m. This amount of boron in an irrigation water is now looked upon as being non-injurious under ordinary soil and climatic conditions. Nevertheless, it appears to have been ample to affect the Bakersfield sycamores in a characteristic manner late in the year. It is possible, of course, that water containing a larger amount of boron may have been used at some previous time.

A water sample was obtained in Corcoran, No. 1843, which contained .15 p.p.m. of boron. In a number of instances trees were found in Corcoran which were characteristically injured. Such injury, how-

The Occurrence of Boron, etc. (cont'd)

ever, was not uniformly in evidence, and in advance of the analytical results it was concluded that Corcoran was probably on the outskirts of the boron area. This deduction proved to be correct. Five miles west of Corcoran a shallow well, No. 1844, contained .86 p.p.m. of boron, and a deep well, No. 1845, contained .48 p.p.m. It is quite possible that water containing more boron has been used in Corcoran in times past.

A series of 10 wells, Nos. 1845 to 1854, were sampled in and beyond the dry bed of the Old Tulare Lake, No. 1854 being 20 miles west of No. 1845. The boron content of these wells varied from .27 p.p.m. to .87 p.p.m. and their conductances varied from 62.3 to 243.0. The first seven of these wells, Nos. 1845 to 1851, contained relatively small amounts of sulphates but they were all relatively high in bicarbonates, and, excepting the first, they were all relatively high in chlorides. Wells Nos. 1852 to 1855, which were all beyond the lake bed, were all high and quite uniform with respect to sulphates and with one exception relatively low in HCO_3 and Cl. Of these wells, Nos. 1846 to 1851, all produced considerable gas and the water was quite warm. The temperatures of the discharge water for the first five of these were, respectively, 32, 34, 33, 37, and 32° C. The temperature of well No. 1851 was not taken. A match tossed across the outlet of one of the wells in this area caused the gas which was being emitted to burn with a 3-foot flame. The amounts of boron found in this series of ten wells do not appear to bear definite relationships to the chemical composition of the samples in other respects.

A group of three well samples, Nos. 1856, 1857, and 1858, 20 miles north of wells Nos. 1852, 1853, and 1854, were collected on the southwest corners of diagonally adjacent sections. In this instance a distinct relationship existed between the conductances of the samples, which were 182.0, 105.0, and 98.4, and the quantity of boron present. The respective boron contents were 1.74, 1.19, and .95 p.p.m. Sodium, chlorine, and bicarbonates were the principal variables influencing these conductances.

Sample No. 1854, collected 24 miles west of Corcoran, is possibly noteworthy. Under this well, which contained but .38 p.p.m. of boron and about 600 p.p.m. of total solids, grapes, plums, walnuts, pears, apricots, and melons all showed typical boron injury and the cottonwood leaves were severely burned at the margins. Under more favorable soil and climatic conditions many sensitive plants would probably have shown only minor injury from this quantity of boron. The Riverside city water contains almost as much boron, and boron symptoms are practically absent.

A water sample was collected in the city of Fresno, No. 1869, which contained but .01 p.p.m. of boron. None of these symptoms which were attributed to boron elsewhere were observed in Fresno.

Seven samples, Nos. 1871 to 1877, were obtained on this trip in the vicinity of Mendota. These samples, some of which were from widely separated wells, varied in their boron content from 1.02 to 2.13 p.p.m. One well in the group, No. 1876, was particularly high both in conductance, 489, and in its boron content, 2.13 p.p.m.

Mention has already been made of the fact that a series of samples collected between Hanford and Mendota, including wells in or in the vicinity of Wheatville, San Joaquin, and Tranquility, were all high

The Occurrence of Boron, etc. (cont'd)

in boron, and in all of these the alkaline bases greatly exceeded the calcium and magnesium content.

The waters from the wells in the area south and east of Mendota are almost uniformly soft waters. In but a few instances were the combined calcium and magnesium contents of these waters found to exceed the alkali base or sodium contents. In general the soils were inclined to be hard, as might be expected in view of the quality of the water. When soils become hard and impervious, an accumulation of boron, along with other salts, is expected to occur in the upper soil layers, and with this accumulation the severity of the resultant crop injury becomes more pronounced.

Table 1.- The quality of water from various sources on the west side of the San Joaquin Valley, California. Analyzed by L. V. Wilcox at the Limoneira Laboratory.

Lab. No.	Date, 1929	KX10 ⁵ at 25°C.	Boron, p.p.m.	Milligram equivalents					
				CO ₃ T HCO ₃	Cl	SO ₄	Ca	Mg	AB
1117	May 24	76.8	.78	4.76	2.94	.44	.44	.32	7.38
1372	June 22	580.0	1.47	1.75	44.50	15.18	10.80	6.41	44.22
1373	22	140.3	1.88	1.39	1.39	10.90	2.02	.13	11.53
1374	22	95.6	1.00	2.13	.79	6.42	1.28	0.0	8.06
1375	22	77.6	.67	4.64	2.88	0.0	.16	0.0	7.36
1376	22	90.6	.31	7.20	1.75	.44	3.05	2.31	4.03
1377	22	5.4	.05	.30	.05	.06	.25	0.0	.16
1839	Sept. 24	23.6	.09	1.50	.50	.41	.49	0.0	1.92
1840	24	34.4	.15	2.40	.90	.14	.59	.51	2.34
1841	24	34.9	.11	1.80	.90	.63	1.03	.71	1.59
1842	24	20.0	.07	1.60	.20	.17	.45	trace	1.52
1843	24	18.2	.15	1.50	.20	.13	.61	0.0	1.22
1844	24	134.0	.86	9.50	2.00	2.93	1.67	.40	12.37
1845	25	62.3	.48	6.40	.50	.05	1.23	.96	4.76
1846	25	108.0	.49	4.60	5.90	.06	1.27	.32	8.97
1847	25	144.0	.27	6.90	7.30	.05	2.49	1.20	10.56
1848	25	124.0	.46	5.60	6.70	.02	1.43	.48	10.41
1849	25	243.0	.91	10.00	14.60	.15	2.31	1.28	21.16
1850	25	171.0	.87	10.60	7.60	.09	1.77	1.20	15.32
1851	25	145.0	---	7.30	7.00	.40	1.15	1.60	11.95
1852	25	100.0	.38	1.40	1.10	7.22	2.89	1.15	5.68
1853	25	98.5	.40	1.50	1.20	6.86	2.55	.87	6.14
1854	25	93.3	.38	1.50	1.20	6.34	2.19	.38	6.47
1855	25	96.3	1.10	2.10	.70	6.35	1.59	.32	7.24
1856	25	182.0	1.74	2.50	9.80	5.12	1.45	.56	15.41
1857	25	105.0	1.19	1.50	2.10	6.69	1.63	.93	7.73
1858	25	98.4	.95	1.10	.90	7.31	1.47	trace	7.84
1859	26	44.8	.66	1.80	2.30	.35	.61	0.0	3.84
1860	26	27.5	.13	2.60	.20	.33	.75	trace	2.38
1861	26	58.0	.89	4.60	1.50	.34	.61	0.0	5.83
1862	26	86.1	1.30	5.30	2.80	.85	.53	trace	8.42
1863	26	94.8	1.30	7.10	2.60	.70	1.07	trace	9.33

(table cont'd on next page)

The Occurrence of Boron, etc. (cont'd)

Table 1 continued

Lab. No.	Date, 1929	K X 10 ⁵ at 25°	Boron, p.p.m.	Milligram equivalents					
				CO ₃ + HCO ₃	Cl	SO ₄	Ca	Mg	AB
	Sept.								
1864	26	111.0	1.29	4.50	4.60	1.74	0.75	0.03	10.06
1865	26	125.0	.78	3.00	1.30	7.74	1.49	trace	10.55
1866	26	72.4	.80	3.60	2.00	2.25	.67	0.0	7.18
1867	26	118.0	.93	1.90	1.30	7.50	1.05	.03	9.62
1868	26	112.0	.97	2.20	1.20	6.70	1.09	trace	9.01
1869	26	21.6	.04	1.60	.31	.29	1.05	.45	.69
1870	27	39.3	.01	2.50	.70	.36	1.63	1.28	.65
1871	27	166.0	1.23	2.30	2.30	11.40	1.01	.19	14.90
1872	27	155.0	1.23	3.00	2.50	9.97	1.53	1.48	12.46
1873	27	199.0	1.39	3.20	6.20	9.33	1.59	trace	17.14
1874	27	149.0	1.57	4.00	1.50	10.59	3.01	5.50	7.58
1875	27	389.0	1.02	2.70	26.70	9.29	4.51	3.05	31.13
1876	27	489.0	2.13	3.40	35.20	11.59	3.89	1.44	43.86
1877	27	130.0	1.97	3.20	1.80	8.65	1.35	.90	11.40
1878	27	6.44	.07	.40	.15	.57	.47	trace	.65
1879	27	6.23	.04	.40	.20	.56	.49	.38	.29

Description of Samples of Table 1

- 1117 Lemoore; deep well, city water supply.
- 1372 SW cor. Sec.17, T 14 S, R 14 E (Mendota); depth 1500 ft.
- 1373 Sec.10, T 16 S, R 15 E (Tranquillity); depth 1500 ft.
- 1374 Sec. 3, T 20 S, R 18 E (Westhaven); deeper than 1500 ft.
- 1375 Lemoore, same as No. 1117.
- 1376 Lemoore; shallow well at schoolhouse.
- 1377 Irrigation Canal, Hanford-Lemoore Highway, Kings River water.
- 1839 Alpaugh Irrigation District Canal; Alpaugh, from group of wells at Smyrna.
- 1840 Alpaugh city water; well depths approximately 1000 ft.
- 1841 Angiola; Bryson Ranch, domestic well, 75 ft.
- 1842 Bryson Ranch, irrigation well 350-400 ft. (Angiola).
- 1843 Corcoran city water; depth 400 to 460 ft. 2 wells.
- 1844 W $\frac{1}{2}$ cor. Sec.6, T 21 S, R 22 E; shallow domestic well (Corcoran)
- 1845 Sec.24, T 21 S, R 21 E; depth 1425 ft.; water level 49 ft.
- 1846 E $\frac{1}{2}$ cor. Sec. 1, T 22 S, R 21 E; depth 1800 ft. 32° C.
- 1847 SE cor. Sec. 8, T 22 S, R 21 E; depth 1970 ft. Perf. below 1400 ft. T. 34° C.
- 1848 N center Sec.36, T 21 S, R 20 E; depth 1800 ft. T. 33° C.
- 1849 NW cor. Sec.30, T 21 S, R 20 E; depth 1950 ft. T. 37° C.
- 1850 NW cor. Sec.18, T 21 S, R 20 E; depth 1800 ft., 160 ft. lift. T. 32° C.
- 1851 NW cor. Sec. 1, T 21 S, R 19 E; depth 1700-1800 ft.
- 1852 NW cor. Sec.15, T 21 S, R 18 E; depth 1700 ft. (Murray).
- 1853 N $\frac{1}{2}$ cor. Sec.23, T 21 S, R 18 E; depth 1400 ft. Perf. below 500 ft. T. 28° C. (Murray)
- 1854 W $\frac{1}{2}$ cor. Sec. 14, T 21 S, R 18 E; depth 1000 ft. Perf. below 500 ft.
- 1855 NE cor. Sec. 3, T 20 S, R 18 E.
- 1856 SW cor. Sec. 7, T 18 E, R 17 E; depth 1700 ft. Lift 150 ft. Perf. below 900 ft. T. 33°.
- 1857 SW cor. Sec. 5, T 18 S, R 17 E; depth 1800 ft. Perf. below 900. T. 31.5° C.

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The Occurrence of Boron, etc. (cont'd)

- 1858 SW cor. Sec. 33, T 17 S, R 17 E; depth 1800 ft. Perf. below 900.
T. 30° C.
- 1859 Hanford city water, Station No. 1; depth 900 ft. Perf. below 600.
Static level 44 ft.
- 1860 Hanford city water, Station No. 2; depth 1500 ft. Perf. below 600.
Static level 38 ft.
- 1861 NE cor. Sec. 25, T 17 S, R 18 E; depth 408. Perf. below 150.
- 1862 NE $\frac{1}{2}$ of Sec. 30, T 17 S, R 19 E; depth 195 ft. Perforated from top.
Lift 50 ft.
- 1863 Stimson Irrigation District well No. 7. NE $\frac{1}{4}$ cor. Sec. 9, T 17 S,
R 18 E; depth about 200 ft.
- 1864 SW cor. Sec. 36, T 16 S, R 18 E; 12-inch discharge pipe.
- 1865 San Joaquin city well; depth 1700 ft.
- 1866 James Irrigation District, Plant No. 29-G. 1 mile west San Joa-
quin. T. 34.5°. Strong sulphur odor.
- 1867 Tranquillity; city well, 880 ft.; not perforated.
- 1868 Tranquillity Creamery; depth 993 ft.; not perforated.
- 1869 Service station, White's Bridge Highway. Ed. Nunes. Depth 70 ft.
Not perforated.
- 1870 Fresno city water. Faucet. E. & Fresno Streets.
- 1871 Mendota city water; depth 506 ft.; lower 50 perforated. Water
stands at 67.
- 1872 SW cor. Sec. 13, T 14 S, R 14 E (Mendota).
- 1873 SW cor. Sec. 15, T 14 S, R 14 E; depth 1250 ft. Perf. below 600.
T. 29° C.
- 1874 SW cor. Sec. 8, T 14 S, R 14 E; depth 1400 ft., 167 to water. Cool.
- 1875 NW cor. Sec. 6, T 14 S, R 14 E.
- 1876 S $\frac{1}{2}$ cor. Sec. 9, T 13 S, R 13 E; well No. 19, depth 1400 ft., per-
forated below 580. T. 33° C.
- 1877 SE cor. Sec. 9, T 13 S, R 13 E; T. 28° C.
- 1878 Helm Canal near South Dos Palos.
- 1879 Arroyo Canal, near Los Banos.

Area north of Mendota under the West Side
San Joaquin Canals

Our present knowledge with respect to the occurrence of boron in the area lying under the canals diverted to the west from the San Joaquin River at Mendota is based largely on observations made there on October 7 and 8. The conditions in this area are summarized in the following letter addressed to Mr. Olsen, who is the manager of the Miller and Lux, Inc., properties. This corporation owns a considerable proportion of the land in this area and also controls the canals which serve the territory.

"January 10, 1930.

"Mr. A. R. Olsen,
Miller & Lux, Inc.,
Los Banos, Calif.

Dear Mr. Olsen:

"The results of the analyses of the water samples collected in the vicinity of Mendota and Los Banos have now been reported by our Limoneira Laboratory. A copy of these analyses are inclosed herewith for your information.

The Occurrence of Boron, etc. (cont'd)

"Of these samples Nos. 1947 to 1951, inclusive, were taken from the Fresno Slough, the San Joaquin River, or from the canals. The results of these analyses confirm the view which I held on the occasion of my second visit, namely, that there was no adequate reason for believing that significant amounts of boron might originate from any of these sources, although at the time it seemed desirable that determinations should be made particularly of water which had been stored in the slough.

"The evidences of the effects of boron on the vegetation in South Dos Palos, Dos Palos, Los Banos, Gustine, and Newman seemed unmistakable, and a number of collections of leaf samples were made. The analyses on this latter material have not been completed as yet. When they are reported it is my view that they will amply confirm the conclusions drawn with respect to the occurrence of significant amounts of boron in many of the soils of this district.

"In some of the plantings visited boron seemed to be especially abundant, while in other places it was evidently present only in small amounts or its occurrence was quite irregular.

"It has been our experience that boron usually occurs in toxic quantities in the surface layers of soils only as the result of having been deposited there by boron-carrying waters. From this point of view and in view of the fact that the water from the San Joaquin does not contain significant amounts of boron, two general characteristics of the region seemed to be of particular interest. The first of these was that in general in this region the water-table is relatively high, varying, I believe, from a few inches to perhaps 14 feet; and second, that in former years a considerable number of flowing and pumped wells supplied irrigation water. In some instances pumped water is now used. In the absence of adequate drainage any boron originating from these wells would tend to be accumulated and concentrated in the surface soil and ground water.

"For the purpose of determining if water from the present wells contained significant amounts of boron, six scattered samples were obtained. Two of these, Nos. 1953 and 1957, were from flowing wells, one near Los Banos and one in the foothills south and west of Gustine. At the time of sampling, these wells were delivering only very small amounts of water. The water of the Allen Ranch, No. 1953, contained 2.74 p.p.m. of boron and the Big Water well contained 2.73 p.p.m. The waters from these wells resemble one another only with respect to the amount of boron which they contain. The well at Newman, No. 1955, was also a deep well (425 ft.) and it contained .98 p.p.m. of boron. The 25-ft. Ben Oregon well on the outskirts of Los Banos contained 1.13 p.p.m. of boron; and the 36-ft. McBride well near Gustine, which irrigates walnuts, contained .64 p.p.m. of boron. The remaining well, No. 1954, was in the city of Gustine. I was told that this water, which contained .46 p.p.m. of boron, had been used for but a few years. The boron symptoms in Gustine were especially marked; and while we would expect some injury from this amount of boron, it is possible that earlier wells may have contained a greater amount. It is noteworthy that the water of all of these wells, which were selected largely at random, contained injurious amounts of boron.

"The injury which results from boron is relative not only to the quantity which is present in the soil, but also to the kind of crops

The Occurrence of Boron, etc. (cont'd)

which are grown. We know that good yields may be obtained from cotton, alfalfa, from some of the cereals, and from other crops in the presence of considerable amounts of boron when other conditions are favorable. Walnuts and lemons, however, are especially sensitive to boron and to a lesser extent many of the deciduous fruits. Boron reduces considerably the growth of grapes. Trial and error in your district has doubtless indicated the crops which in general are most profitable under the existing conditions. Assuming the use of San Joaquin water, the facts now available would indicate that adequate drainage should serve to increase the productiveness and value of these lands. You probably recognize the general applicability of this view, and my statement, therefore, refers particularly to the boron problem.

"In all probability we will want to obtain additional information concerning the character of the water, both in other wells and in the water-table. For the moment, I am inclined to postpone the consideration of additional observations until I have had an opportunity to discuss the situation with the Chief of this Division, Mr. C. S. Scofield, who plans to be in California in the near future.

Very truly yours,

(Signed) Frank M. Eaton

Associate Physiologist"

Table 2.- The quality of water samples collected from the Fresno Slough, from the San Joaquin River, from canals diverted from the San Joaquin at Mendota or below, and from wells in the vicinity of Los Banos, Gustine, and Newman. Analyzed by L. V. Wilcox at the Limoneira Laboratory.

Lab. No.	K K 10 ⁵ at 25°	Boron, p.p.m.	Milligram equivalents					
			CO ₂ +HCO ₃	Cl	SO ₄	Ca	Mg	AB
1947	9.93	0.02	0.20	0.10	0.15	0.40	0.13	0.52
1948	5.29	.11	.30	.15	.08	.32	.09	.12
1949	5.55	.07	.30	.05	.09	.30	0.0	.14
1950	5.15	.05	.25	.10	.06	.25	trace	.16
1951	5.68	.05	.30	.05	.08	.28	"	.15
1952	109.0	1.13	36.40	2.45	3.05	3.23	4.04	4.63
1953	515.0	2.74	3.30	6.75	53.07	15.40	23.75	28.99
1954	68.0	1.46	3.55	1.03	2.41	2.50	1.67	2.84
1955	112.0	.98	3.00	5.95	1.45	1.74	1.80	7.26
1956	112.0	.64	6.90	2.25	2.98	4.91	1.73	5.49
1957	139.0	2.73	3.65	1.85	8.30	1.71	.64	11.95

Description of Samples of Table 2

- 1947 Fresno Slough: At White's Bridge, Sec.4, T 14 S, R 15 E; water very turbid. Oct. 7, 1929.
- 1948 Columbia Canal: Diverted from San Joaquin River channel 5 to 8 miles above Mendota Dam; discharge 20 c.f.s. Oct. 7, 1929.
- 1949 San Joaquin River: Below Mendota Dam; discharge 100-200 c.f.s. Oct. 7, 1929.
- 1950 Helm Canal: 100 yds. below diversion from Mendota Dam, 150 c.f.s. discharge, slightly cloudy. Oct. 7, 1929.

The Occurrence of Boron, etc. (cont'd)Description of Samples of Table 2 (cont'd)

- 1951 Main Canal: 150 ft. below diversion from Mendota Dam; water cloudy estimated as half slough and half river water; discharge 150 c.f. Oct. 7, 1929.
- 1952 Ben Oregon: On the northern outskirts of Los Banos toward Gilroy; 25-ft. well used around house. Oct. 8, 1929.
- 1953 Allen Ranch: Near Gustine, Sec. 11, T 9 S, R 8 E; flowing well, 360 ft. deep, 9 in. casing now just a trickle of water; leased by Joe Boredore; well in inlet to foothills. Oct. 8, 1929.
- 1954 Gustine: City water, new well about 150 ft. deep. Oct. 8, 1929.
- 1955 Newman: Golden State Milk Plant, 425 ft. deep, not perforated. Oct. 8, 1929.
- 1956 E. K. McBride: 36 ft. well, Sec. 17, T 8 S, R 9 E; irrigates walnuts. Oct. 8, 1929.
- 1957 Big Water: Flowing well in mud slough, NW $\frac{1}{2}$ 27, T 10 S, R 11 E; casing 308 drilled to 385 ft. depth below casing in clay. Drilled in 1913, now just flowing. Oct. 8, 1929.

Water Sources of San Joaquin Valley

As occasion has permitted, samples have been secured from the rivers flowing into the San Joaquin Valley from the Sierra Nevadas. Streams arising in this watershed constitute almost the entire water supply of the valley. The quality of these waters is a matter of considerable importance in connection with the west side boron area, since it is generally presumed that the bulk of the underground water on this side of the valley originates in the mountains to the east.

Small streams, or more properly washes, bring down some water from the east side of the coast range, but their contribution is relatively minor. It is known that a few mineral springs are located in the foothills of the Coast Range. The analyses of none of these springs have come to our attention, nor have their boron contents been investigated by us. In any event, all of these springs are presumably quite small.

The results of the analyses of samples from the rivers arising in the Sierra Nevadas and from one or two other sources are given in Table 3. Except for one of the analyses of the Kern River, the sample from Caliente Creek and the sample from Grapevine Creek, the boron contents of these waters are extremely small. Caliente Creek and Grapevine Creek rise in mountains to the south of the valley and so do not contribute water to the area under discussion. The Kern River, likewise, is considerably south of the greater portion of this area.

The Occurrence of Boron, etc. (cont'd)

Table 3.- Analyses of rivers and creeks flowing into the San Joaquin Valley. Analyzed by L. V. Wilcox at the Limoneira Laboratory.

Lab. No.	Date, 1929	K X 10 ⁵ at 25°	Boron, p.p.m.	Milligram equivalents					
				CO ₃ --HCO ₃	Cl	SO ₄	Ca	Mg	AB
952	April 25	15.9	0.35	1.20	0.30	0.20	0.72	trace	0.95
1380	June 23	11.1	.17	.57	2.48	4.35	.43	0.0	6.97
1365	16	7.2	.03	.47	.05	.14	.33	.03	.30
1377	22	5.4	.05	.30	.05	.06	.25	0.0	.16
1946	Oct. 6	14.8	trace	1.10	.15	.18	.68	.09	.66
1948	7	5.29	0.11	.30	.15	.08	.32	.09	.12
1366	June 16	5.9	.08	.32	.13	.12	.24	0.0	.33
1370	21	5.0	.02	.33	.36	.08	.16	.03	.58
1371	21	16.2	.08	1.22	.15	.16	.61	.22	.70
1944	Oct. 6	105.0	.92	7.10	.85	3.89	2.03	5.37	4.44
926	April 23	113.1	.25	5.11	1.65	5.31	5.42	3.38	3.27
928	23	134.0	.87	5.69	1.92	7.33	4.98	5.66	4.30

Description of Samples of Table 3

- 952 Kern River at Bakersfield.
 1380 Kern River at Bakersfield.
 1365 Kings River near Kingsburg.
 1377 Kings River from irrigation canal near Lemoore.
 1946 Kings River near Kingsburg.
 1948 San Joaquin River, Columbia Canal at Mendota.
 1366 San Joaquin River at Herndon.
 1370 Tuolumne River, canal in Turlock Irrigation District.
 1371 Merced River near Merced.
 1944 Grapevine Creek above Caliente.
 926 Tehachapi Creek at Keene.
 928 Caliente Creek above Caliente.

Frank M. Eaton

Rubidoux Laboratory,
 Riverside, California,
 January 20, 1930.

WEEKLY REPORTS
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February 1, 8, and 15, 1930

No. 3

Huntley

Report for period ending February 15

The weather during the first half of February was mild and there is no snow left in the lower valleys. The precipitation during this period amounted to but .05 inch. During the month of January the precipitation was .77 inch. Extremely cold weather prevailed during most of January. From January 6 to January 22, inclusive, the minimum temperature each day was below zero. The range in minimum temperatures during this period was from -2° to -35° .

The lamb-feeding experiment was completed on February 9. In this test ten lots of 30 lambs each were on feed for a period of 110 days. These lambs were fed on a price-spread contract and were taken in at \$11 per hundredweight and turned back to the contractor at \$12.25 per hundredweight.

A Lamb Feeders' Day was held at the station on February 15. At this meeting the results of the feeding experiment were presented by Mr. Louis Vinke of the Animal Husbandry Department of the Montana Experiment Station. About 200 people from the project and other sections of the Yellowstone Valley attended this meeting. The results of the feeding experiment are reported elsewhere in this issue.

Local lamb feeding operations this season usually resulted in a loss, which was sustained by the feeder if he purchased the lambs, and by the contractor if the feeding was done on a price-spread contract. The purchase value of the feeder lambs in October was from \$11 to \$11.50 per hundredweight, and the present price of top, fat lambs is about \$11.50. Since the cost of marketing, including freight and shrinkage, is about \$2, the local value of the finished lambs is only about \$9 to \$9.50.

The situation with regard to the cattle market is more favorable, and local cattle feeding operations are generally resulting in some profit to the feeder.

Dan Hansen.

Scotts Bluff

The weather conditions for the week ending February 1 changed for the better. The maximum temperature was 38 and the minimum was 8 below zero. January 30 was the first time in 25 days that the temperature was above freezing, and with one exception it was below zero each night. The last three days have been very pleasant and the snow is going very fast.

Our Lamb Feeders' Day will be held on April 3. The prices for fat lambs are still on the down grade. Most lambs that are being marketed now are showing a financial loss.

Butterfat has recovered some in price. It is now bringing 51 cents whereas it did go as low as 36 cents a pound.

James A. Holden

San Antonio

Report for four-week period ending February 8 and climatological summary for month of January.

The following is a tabulated summary of the climatological data recorded for the four weeks January 12 to February 8, inclusive, and for the month of January 1930:

Week ending	Temperature					G. D. R.	Pre- cipita- tion inches	Aspect of the sky		
	Maximum		Minimum		Mean			Clear days	Partly cloudy days	Cloudy days
	Abso- lute	Mean	Abso- lute	Mean						
Jan. 18	64	48.1	9	27.7	37.9	33	.25	2	1	4
" 25	59	44.3	12	23.1	33.8	30	.24	2	0	5
Feb. 1	66	58.9	26	39.6	49.2	28	.73	1	2	4
" 8	80	70.6	34	41.7	56.1	41	.23	4	1	2
January	73	52.2	9	31.5	42.8	33	1.35	6	6	19

Temperatures were seasonable at the beginning of January, but soon started on a general descent which lasted throughout the month. The absolute minimum of 9 degrees was recorded for the night of the 17th. This was one degree colder than the minimum recorded for the preceding December and equalled the all-time record for the station. The minimum temperature went below 20 degrees on five nights and killing frosts occurred 14 nights during the month. This was the coldest January on record at the station, the mean for the month, 42.8, being 9 degrees below normal and 2.2 degrees lower than ever recorded for the same month during the preceding 23 years. Temperatures during the first week of February were again more seasonable.

A measurable quantity of rain was recorded on 14 days of January and for the first three days of February, the amounts per period of 24 hours varying from .02 inch to .39 inch. Total precipitation during the winter has been relatively light, but owing to the prevailing low temperatures and the two periods of severe freezing very little has been used by vegetation and a "good season" generally is now in the ground.

The miserable, misty weather which prevailed through most of January made outdoor activities either impossible or extremely disagreeable. Only six days were clear while 19 were recorded as cloudy and six as partly cloudy.

Many of the broad-leaf evergreen species on the station and around San Antonio were severely damaged by the January freeze. Washingtonia palms, which had had most of the outer leaves killed during the December freeze, suffered the further killing of the remaining leaves. Nothing green can be found on the Phoenix palms (either dactylifera or canariensis), although it is believed they will resume growth after warm weather arrives. Most California privets were completely defoliated, while the Japanese privet (Ligustrum japonicum) suffered in inverse proportion to the vigor of the individual specimens, some of the less hardy losing all leaves while adjacent, vigorous plants lost only the more succulent young growth. Meyer lemons and Satsuma oranges which were wrapped in sorghum stalks and mounded up with dirt have not been uncovered and their condition is not yet known; but all unprotected citrus on the station has been killed to the ground with the exception of Rusk citranges, which were defoliated and only the younger wood killed.

San Antonio (cont'd)

Small grains had made little recovery from the December freeze and were further damaged by the January cold, with the result that stands have been seriously reduced and practically no winter pasturage has been available. Canadian field peas have been winterkilled 100 per cent.

The flax variety test planted January 2 was just emerging when the freezing weather arrived and the planting was entirely destroyed. A few varieties in the nursery planting which were slow to emerge were not killed and have since emerged to thin stands. The variety test was replanted February 7. A third planting in the "Date of Seeding Flax" experiment was made February 5.

Only two laborers were retained on the station during the last month. The greater portion of their time was spent in repairing plumbing damaged by the freeze, repairing and painting mess hall kitchen, cleaning, repairing, and painting farm machinery, and laying a $1\frac{1}{2}$ -inch pipe line for irrigating orchard and nursery on Field A-1.

Mr. C. J. King, Agronomist in charge of the U. S. Sacaton Field Station, visited the station on January 13. Mr. G. M. Mkrtchian, Chairman, Central Collective Farm Corporation, Erivan, Armenia, U.S.S.R., conferred with station personnel on January 11 and again on January 13 relative to cotton production under semiarid conditions in the Southwest.

The writer left the station January 14 via automobile for the Lower Rio Grande Valley where he joined Mr. C. S. Scofield, Principal Agriculturist, and three days were spent interviewing water-users and officials of the water districts and inspecting valley conditions with special reference to water supply and drainage problems. Upon returning to San Antonio Mr. Scofield spent two days at the station and in the vicinity before leaving January 20 for California.

I. M. Atkins, Junior Agronomist and Assistant Superintendent, left for Washington January 23.

Geo. T. Ratliffe.

Yuma

The maximum temperature for the week ending February 1 was 74, minimum 35, greatest daily range 39, and precipitation .07 inch.

The meteorological data for the month of January are as follows: Maximum 76, mean maximum 66.1; minimum 26, mean minimum 37.8; and precipitation .33 inch. Eleven days of the month were clear, 12 were partly cloudy, and 8 were cloudy. A rather cloudy condition prevailed through the entire month.

The ginning of cotton on the Yuma Project is about finished, many of the gins having already closed for the season and the others planning to do so very soon. During the past week only 121 bales of cotton were ginned. The total amount now ginned is 31,465 bales.

Station work for the past week included the cultivation of vetch, making grape and pomegranate cuttings, and general pruning on the station grounds.

Yuma (cont'd)

The weather during the week ending February 15 was exceptionally warm for this time of the year. The maximum temperature was 88, minimum 38, and greatest daily range 49. No precipitation was recorded. All the days of the week were clear.

The Yuma Valley is beginning a new alfalfa year with much enthusiasm. The cotton acreage is being cut down and much of it has been replaced by alfalfa. During the past year the Yuma Valley produced 3,000,000 pounds of alfalfa seed. A ready market is usually found for this product. The growers are now receiving 26 cents a pound for their seed.

The cotton ginning operations on the Yuma Project have ceased. The gins were closed about a month earlier than they were in 1928. A total of about 32,000 bales of cotton was ginned the past season.

Station work the past week included the plowing of cotton plots on borders A and B, pruning trees, and fencing the two alfalfa plots in the rotations that are to be used for hog pasture.

Station visitors the past week were S. P. Clark of the University of Arizona and M. R. Wells of the U. S. Bureau of Agricultural Economics.

Arthur T. Bartel.

M I S C E L L A N E O U S

EXPERIMENTAL RESULTS WITH FATTENING LAMBS USING BEET BY-PRODUCTS

By Louis Vinke and Dan Hansen

Fattening lambs for market is a ranch enterprise particularly adapted to the sugar beet districts of Montana. In an effort to secure reliable data as to the comparative values of different feeds and rations, fattening tests were inaugurated last fall as a part of the investigational work of the Huntley Field Station.

Range wether lambs with a predominance of Rambouillet breeding were used in these trials. The lambs were smooth, of good type and quality, and were of light weight.

Equipment.— The feedlots consisted of a row of ten pens extending east and west and divided by woven-wire fencing. Each pen was 28 feet by 65 feet. The north end of each pen was closed with two 14-foot board panels, and the south end was closed with panels constructed so that lambs could eat feeds placed along the outside of the panels. These panels had a 10-inch board on the bottom, an 8-inch feeding opening, and two 6-inch boards above this opening. One 16-foot and one 14-foot panel of this type were placed in zigzag fashion along the south side of each pen. In eight of the pens, where more than one roughage was fed, two additional 14-foot feeding panels placed 30 inches apart extended from the center of the south side, or from the juncture of the panels mentioned above, into the pen with short pieces nailed across the end. Four grain feeding pens equipped with invertible grain troughs were constructed just north of the other pens. One foot of feeding space was allowed for each lamb at panels and troughs.

The feedlots had wind protection from the north and northeast by trees and station buildings and on the west by a tight board windbreak.

Results with Fattening Lambs (cont'd)

A pulp silo 16 feet by 32 feet by 5 feet was constructed with posts, woven wire, and straw, and boarded up at one end to hold the pulp supply, which consisted of two carloads.

Description of Feeds

Barley. - Trebi barley of excellent quality.

Corn. - Nebraska No. 2 yellow.

Cottonseed cake. - Prime quality, sheep size, 43 per cent protein.

Cull beans. - Good clean culls and splits of Great Northern beans.

Beet molasses. - Beet molasses from Great Western Sugar Company.

Alfalfa. - First and third cutting alfalfa of good quality.

Beet pulp. - From pulp silo at station. Secured from Great Western Sugar Company at beginning of test. The shrinkage from purchased weight was 44 per cent.

Beet tops. - Excepting the first few weeks when tops were slightly molded, good quality tops which had been piled in field.

Corn silage. - Good silage from well matured Payne's White Dent yielding 40 bushels of corn or 11 tons of silage per acre.

Bean straw. - Bright straw of good quality from Great Northern beans.

Losses. - Unusually heavy losses occurred this year. Four and one-half per cent of the lambs died. The losses, however, could not be attributed to any particular ration.

Method of Feeding

Time of feeding. - A light feed of hay was given the first thing in the morning, in the middle of the forenoon a larger amount was fed, which was stirred up at noon, and a heavy feed was given at dusk. In addition, bean straw was fed to Lot X with the alfalfa. All other feeds were fed twice daily, morning and evening.

Place of feeding. - Molasses and cake were fed on the pulp along the panels, all roughages along the feeding panels, and grain in the grain feeding pens. Thirty minutes were allowed at every feed for the grain to be eaten.

Feed allowance. - The cottonseed cake was limited to one-fourth pound per head daily and the molasses to one-third pound per head daily. Where cull beans were fed, they comprised one-fourth of the grain ration. The maximum allowance of all grain rations and roughages was fed to all lots except Lot X, which was limited to one-half the amount of alfalfa that was fed to Lot IX.

FATTENING LAMBS

Oct. 22, 1929 to Feb. 9, 1930

110 Days

Lot number	I	II	III	IV	V	VI	VII	VIII	IX	X
Ration	Barley Alfalfa	Barley Alfalfa Cull Beans	Barley Alfalfa Tops	Barley Alfalfa Silage	Barley Alfalfa Pulp	Barley Alfalfa Pulp C.s.cake	Barley Alfalfa Pulp C.S.cake Molasses	Corn Alfalfa Pulp C.s.cake Molasses	Alfalfa Pulp C.s.cake Molasses	Alfalfa Pulp C.s.cake Molasses Bean straw
Number of lambs	29	30	30	30	30	28	29	30	30	30
Average initial weight (lbs.)	57.9	56.9	56.5	56.7	57.9	57.0	57.1	57.2	56.7	56.7
Average final weight (")	89.9	87.1	92.1	87.0	94.2	94.2	99.0	99.8	93.3	91.4
Average daily gain (")	.291	.275	.324	.275	.330	.338	.381	.387	.333	.315
Average daily feed: lbs.										
Barley.....	1.17	.85	1.09	.99	1.00	.95	.99	---	---	---
Corn	---	---	---	---	---	---	---	.95	---	---
Cottonseed cake	---	---	---	---	---	.22	.22	.21	.21	.21
Cull beans	---	.28	---	---	---	---	---	---	---	---
Beet molasses	---	---	---	---	---	---	.29	.29	.29	.29
Alfalfa	1.78	1.79	1.22	1.02	1.16	1.19	1.18	1.22	1.75	.88
Siloed beet pulp	---	---	---	---	5.11	5.11	5.16	5.01	7.77	6.87
Beet tops	---	---	2.36	---	---	---	---	---	---	---
Corn silage	---	---	---	2.33	---	---	---	---	---	---
Bean straw	---	---	---	---	---	---	---	---	---	1.42
Cost per cwt. gain*	\$8.69	\$8.62	\$7.67	\$8.28	\$7.82	\$9.22	\$9.18	\$10.38	\$8.14	\$7.80
Initial cost per cwt.	\$10.50	\$10.50	\$10.50	\$10.50	\$10.50	\$10.50	\$10.50	\$10.50	\$10.50	\$10.50
Initial cost per lamb	6.08	5.97	5.93	5.95	6.09	5.98	6.00	6.01	5.95	5.95
Feed cost per lamb	2.78	2.61	2.73	2.51	2.84	3.43	3.85	4.42	2.98	2.70
Selling price So.St. Paul**	11.30	11.00	10.80	11.25	11.60	11.60	11.50	12.25	11.50	11.00
Selling price Huntley	9.30	9.00	8.80	9.25	9.60	9.60	9.50	10.25	9.50	9.00
Value per head (Huntley)	8.56	7.84	8.11	8.05	9.05	9.04	9.41	10.23	8.86	8.13
Margin over lamb & feed cost	---	---	---	---	---	---	---	---	---	---

*Prices of feeds (per ton): Barley \$28.00; Corn \$40.00; Cottonseed cake \$55.00; Cull beans \$20.00; Molasses \$22.50; Alfalfa \$10.00; Pulp (siloed) \$2.35; Beet tops \$3.00; Corn silage \$3.35; Bean straw \$4.00.

**Based on market with a \$12.00 ton.

Results with Fattening Lambs (cont'd)Comparison of Results

Lots I and II.- Lot I, fed a ration of barley and alfalfa, made more rapid gains at a slightly increased cost, secured a higher selling price, and lost less money than Lot II, where one-fourth of the barley was replaced by cull beans. Lot I had 25 per cent fat lambs, while Lot II had no fat lambs. Cull beans proved so unprofitable in this ration that if they had cost nothing, Lot II would still have been more of a financial failure than Lot I.

Lots I, III, IV, and V.- The addition of beet tops in Lot III to a barley and alfalfa ration increased the gains and reduced the cost of gains, but the lambs were not as fat as those in Lot I, which were fed barley and alfalfa. Consequently, the final valuation in Lot III was less and a greater loss occurred than in Lot I. The addition of silage to a barley and alfalfa ration in Lot IV reduced the gains, the cost of gains, and slightly reduced the selling price in comparison to Lot I.

The addition of beet pulp to a barley and alfalfa ration increased the gains, reduced the cost of gains, increased the selling price, and changed a loss to a slight profit in comparison to Lot I. In comparison to Lot I, if the difference in profit is credited to the pulp, siloed beet pulp was worth \$3.95 per ton.

Comparing Lots III, IV, and V, siloed pulp proved to be a superior feed to silage or beet tops when added to a barley and alfalfa ration. Good gains, an increased percentage of fat lambs together with a higher selling price, and a profit instead of a loss make this ration superior to the others.

Lots V and VI.- The addition of .22 pound cottonseed cake per head daily in Lot VI to a barley, alfalfa, and pulp ration increased the gains and the cost of gains, but did not result in a greater finish or selling price as compared to Lot V, which was fed barley, alfalfa, and pulp. Whether or not the fact that Lot V was off feed about the time the test closed influenced the results is not known. The results of this test indicate that it does not pay to add cottonseed cake to a barley, alfalfa, and pulp ration for fattening lambs.

Lots VI and VII.- Lot VII, which received a ration of barley, alfalfa, pulp, cottonseed cake, and molasses made more rapid gains at about the same cost per hundredweight and was valued at a lower selling price than Lot VI, which was fed a ration of barley, alfalfa, pulp, and cottonseed cake. The use of molasses was not profitable in this case.

Lots VII and VIII.- Lot VII, fed a ration of barley, alfalfa, pulp, cottonseed cake, and molasses did not make quite as rapid gains or sell as high as Lot VIII, which received the same ration except that corn was used in place of the barley. The cost per hundredweight gain was greater in Lot VIII, but since all of the lambs were finished so well that they were valued at \$0.25 premium over market top, there was less loss with the corn-fed lambs than with the barley-fed lambs. The results of this test indicate that No. 2 yellow corn at \$2.00 per hundredweight is better than hull barley at \$1.40 per hundredweight.

Results with Fattening Lambs, etc. (cont'd)

Lots VII and IX.- Lot IX received a ration of alfalfa, pulp, cottonseed cake, and molasses, and did not receive grain. In comparison to Lot VII, which received barley in addition to the above ration, the gains were less, the cost per hundredweight ^{gains} was less, the lambs received almost the same final valuation, and the loss per lamb was less. Lot IX did not have any finished lambs, while Lot VII did. However, the lambs in Lot IX were considered fat enough so that they would finish in a very short time if fed grain.

Lots IX and X.- Lot X received half of the amount of alfalfa fed to Lot IX, and were given all the bean straw they would eat. Both lots received pulp, cake, and molasses. Lot X consumed less pulp than Lot IX, but consumed more dry roughage. The lambs in Lot X made less gain, the cost per hundredweight gain was less, and the final valuation was lower, which resulted in a larger loss than the lambs in Lot IX. The lambs in Lot X were considered feeders, but carried enough meat to bring a premium for feeder lambs.

Summary

1. A ration of barley and alfalfa (full fed) did not finish light lambs in a 110-day feeding period.

2. Cull beans have no value for fattening lambs when used with a barley and alfalfa ration.

3. The addition of beet tops to a barley and alfalfa ration increased the gains and reduced the cost of gains, but did not produce as high a percentage of fat lambs as a ration of barley and alfalfa.

4. The addition of good corn silage to a barley and alfalfa ration reduced the gains, slightly reduced the cost of gains, and increased the financial loss.

5. Siloed beet pulp proved to be far superior to corn silage and beet tops as an addition to a barley and alfalfa ration. The cost of gains was not so low as where beet tops were used, but the net returns were much greater.

6. The addition of cottonseed cake to a barley, alfalfa, and pulp ration gave only a slight increase in gains, but greatly increased the cost of gains and changed a slight profit into a loss.

7. The addition of molasses to a barley, pulp, and cottonseed cake ration increased the gains, but did not increase the selling price or profits.

8. Corn at \$40 per ton increased the cost of gains as compared to barley at \$28 per ton when fed with hay, pulp, cake, and molasses, but the finish and selling price was increased so that the corn-fed lambs reduced the financial loss.

9. The addition of either barley or corn to an alfalfa, pulp, cottonseed cake, and molasses ration increased both the gains and the cost of gains considerably, but on the basis of the present market, with a narrow spread between feeders and fat lambs, also increased the financial loss.

10. Replacing half of the alfalfa with bean straw in an alfalfa, pulp, cottonseed cake, and molasses ration reduced the gains, the cost of gains, and the selling price, and increased the financial loss.

Contract Feeding

Many lambs in Montana are fed on a spread or under contract. The following table shows the results of this year's feeding test if the lambs were purchased at \$11.00 per hundredweight and sold at \$12.25 per hundredweight. Labor, 8 per cent interest in the lambs, half the feed, 4 per cent death loss, and depreciation of equipment were charged at \$1.15 per lamb.

FATTENING LAMBS ON A SPREAD
In at \$11.00, out at \$12.25
110-day feed
Oct. 22, 1929 to Feb. 9, 1930

On Basis of One Lamb

Lot number	I	II	III	IV	V	VI	VII	VIII	IX	X
Ration	Barley Alfalfa	Barley Oull beans Alfalfa	Barley alfalfa Tops	Barley Alfalfa Silage	Barley Alfalfa Pulp	Barley Alfalfa Pulp C. s. cake	Barley Alfalfa Pulp C. s. cake Molasses	Oorn Alfalfa Pulp C. s. cake Molasses	Alfalfa Pulp C. s. cake Molasses	Alfalfa Pulp C. s. cake Molasses Bean straw
Gain	32.0	30.2	35.6	30.3	36.2	37.2	41.9	42.6	36.6	34.7
Initial cost at \$11.00	\$6.37	\$6.26	\$6.21	\$6.24	\$6.37	\$6.27	\$6.28	\$6.29	\$6.24	\$6.24
Feed cost	2.78	2.61	2.73	2.51	2.84	3.43	3.85	4.42	2.98	2.70
Labor, interest on lambs, and feed and death loss	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Total cost	10.30	10.02	10.09	9.90	10.36	10.85	11.28	11.86	10.37	10.09
Final weight less 4% @\$12.25 per cwt.	10.57	10.24	10.83	10.23	11.07	11.07	11.64	11.73	10.98	10.74
Net gain or loss per lamb27	.22	.74	.33	.71	.22	.36	-.13	.61	.65

W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

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No. 4

Scotts Bluff

Report for the month of February

The weather during February was unusually mild, almost like spring. The average maximum temperature was 50 and the minimum 22. The precipitation amounted to .31 inch, of which .21 inch was rain and the remainder snow.

Livestock on the ranges and in the feed-lots are doing well. Beef cattle and hogs are higher in price than they were a year ago. Dairy cows and products are lower. Good dairy cows can be bought for \$50 to \$60 less than last year. The mild weather has stimulated egg production and lowered the price. At the beginning of the month eggs were bringing 40 cents a dozen but at the close of the month had dropped to 18 cents.

The lamb business has been the most disappointing of all. Feeder lambs cost as high as \$13 per hundredweight at the range loading point. Fat lambs on the Omaha market are now selling for from \$9 to \$10 per hundredweight. Feeders are taking a very heavy loss. The lamb-feeding experiments at the Colorado Agricultural College showed a loss per lamb varying from \$4.35 to \$6.18. There are many large feeders in Colorado and western Nebraska who will lose more than a hundred thousand dollars from the lamb-feeding operations this year.

The losses to the lamb feeders in the North Platte Valley will amount to about \$1,500,000 as compared with a profit of perhaps a million dollars last year. This heavy loss from lamb feeding along with the increased expense of harvesting sugar beets last fall and a shrinkage in tonnage due to the severe weather conditions in October is having its effect on the financial conditions of the valley. Business in the towns is slow, farm sales are rather numerous, and banks are more cautious.

The potato sections are the only prosperous spots in the valley. While the price of potatoes did not go as high as was expected, it has been high enough to make the crop very profitable. The potato-growing sections are financially better off than last year, but this is not true of the valley as a whole.

The sugar beet contract will be about the same as last year, \$7 minimum per ton.

The work is progressing satisfactorily at the station. During the past week one of the silos was refilled with shocked corn fodder. Considerable manure has been hauled from the yards. Excavation of the basement for the new addition to the dwelling house is almost completed. The dairyman will use the little cottage, which has been repaired. This will leave the cottage on the eastern side of the drive for Mr. O. K. Barnes and family. Mr. Barnes, who has been in Texas for some time, returned to his old position as station clerk on March 1. The station has been without a clerk since January 10.

Our Lamb Feeders' Meeting will be held on April 3. It is hoped that the lamb market will improve materially before that time.

James A. Holden.

Umatilla

Under date of February 19, Mr. H. K. Dean reported as follows:

"We have had a very hard winter with several minimums below -30 and the absolute -36 with 22 inches of snow. The weather has been open, however, for ten days and we are going ahead rapidly with development work across the road. We will have all the alfalfa and sweet clover seeded by March 10 at the latest. I have just spent two days with the dairyman from the Oregon Station selecting heifer calves for the foundation of the dairy herd."

Yuma

The weather during the first part of the week ending February 22 continued to be warm, but the latter part of the week was cooler and a cloudy condition prevailed. The maximum temperature was 90, minimum 40, and greatest daily range 45. No precipitation was recorded.

The date palms on the station have started to flower. The warm weather during the past two weeks seems to have caused the dates to start flowering about ten days earlier than they did in 1929.

Border B-5 was planted to cotton on February 21. This is the first cotton planted on the station this season. The variety planted was Pima 5-3, 1928 seed obtained from Sacaton, Arizona, being used because it had not been subjected to cross pollination with other strains and varieties.

Station visitors the past week were Mr. J. S. Townsend and Mr. C. J. King of the Office of Cotton, Rubber, and Other Tropical Plants.

Report for the week ending March 1

The meteorological data for the month of February are as follows: Maximum 90, mean maximum 80; minimum 32, mean minimum 42.9; mean 61.5; greatest daily range 49; precipitation .01 inch. Twenty-two days were clear, four were partly cloudy, and two were cloudy. February was very warm, the mean temperature being higher than has ever been recorded for that month since this station was established. The maximum temperature for the week ending March 1 was 74, minimum 32, and precipitation .01 inch.

The alfalfa plots in the rotations that are to be planted to cotton are now being plowed. The alfalfa has grown to a very good height, due to the warm weather. Several farmers in the Yuma Valley have already cut their alfalfa for hay.

On February 24 Border A-3 was fertilized with 13-48 Ammo-phos. The fertilizer was applied to the north half of the plot at the rate of 250 pounds per acre and to the south half at the rate of 500 pounds per acre. The plot was irrigated the same day. The border was planted on February 28. The seed was 1929 Pima 5-3 from the rotations on D.

Arthur T. Bartel.

M I S C E L L A N E O U S

THE ALFALFA SITUATION, WITH RESPECT TO DECLINING YIELDS,
ON THE YAKIMA RECLAMATION PROJECT

Note: Within the last few years frequent statements have been made to the effect that the yields of alfalfa have been declining on the Yakima Project, which is in the southern part of the State of Washington. These complaints have been so numerous that Mr. Wright was asked to make a survey of conditions. The following report covers the findings of this investigation.— S. H. H.

Alfalfa from the standpoint of total acreage is at present an important crop only on the Sunnyside Division of the Yakima Project. Only 14 per cent of the area of the Tieton Division is devoted to alfalfa. While a considerable acreage is grown on the Kittitas Division, this area is not yet receiving water from the Government canal system but is being irrigated in scattered areas from small streams and private irrigation ditches. Alfalfa production on the Indian Reservation in the vicinity of Toppenish and Wapato presents also a different set of problems with respect to soil, water, and methods of handling. Hence this report deals with the crop only on the Sunnyside Division and is based on information obtained from the annual crop reports of the Bureau of Reclamation, from reports compiled by the Yakima Morning Herald, from answers to questionnaires sent to farmers, and from observations on the Prosser Experiment Station.

On the Sunnyside Division at present there are about 29,000 acres of alfalfa. This is approximately one-third of the irrigated area. In 1910 there were 20,630 acres of alfalfa, which steadily increased until 1920 when there were 45,500 acres. Since then there has been a gradual decline until the present time. The rise and fall in the acreage during this 19-year period do not appear to be correlated with the average annual yields. The yields seem to have declined steadily during the entire period under consideration. There is also some reason for believing that the acreage of alfalfa has been reduced since 1920 not primarily because of low yields but because of more attractive returns from other crops, such as potatoes, fruit, pasture, etc.

Cultural and Irrigation Practices

The special varieties of alfalfa, such as Grimm, Baltic, and other hardy varieties, are not grown to any large extent on the project. The strains of common alfalfa from Montana, Kansas, the Dakotas, and Utah occupy almost the entire area. It is believed by some, however, that a certain amount of experimentation with unadapted varieties on the project helps somewhat to reduce the average yield.

There are normally three cuttings produced each year, with a good deal of variation as to the time of cutting. The crop is cut at any time from the one-tenth bloom stage up to full bloom, the majority of the growers cutting at about one-half bloom. In a study* at the

*Singleton, E. P. Bulletin No. 209, State College of Washington. Nov. 1926.

The Alfalfa Situation, etc. (cont'd)

Prosser Experiment Station covering a period of seven years it was found that the one-half bloom stage as compared to the one-fourth or three-fourths bloom was the most profitable time to cut. This is shown in the following table.

Table 1.- Average annual yields and seven-year average yields of alfalfa when cut at different stages of maturity.

Stage of maturity	Average yields in tons per acre							7-year average
	1921	1922	1923	1924	1925	1926	1927	
$\frac{1}{4}$ in bloom	6.84	6.62	5.72	4.95	4.73	6.13	5.55	5.79
$\frac{1}{2}$ in bloom	7.55	8.00	6.72	5.93	5.12	6.94	6.68	6.71
$\frac{3}{4}$ in bloom	8.03	8.11	6.27	6.27	5.93	6.45	5.61	6.67

Alfalfa is ordinarily irrigated about five times during each irrigation season, but the number of irrigations given and the amount of water used varies a good deal on different farms and in different parts of the project. Observations throughout the project, water measurement on the Prosser Experiment, together with some water allotment data on farms in the principal alfalfa-growing districts, all show that in general between 4 and 5 acre-feet of water are required each season on the alfalfa land. There is no satisfactory evidence available to show whether the alfalfa yields on the different parts of the project correspond to the amount of water applied. On the Ahtanum Division of the Indian Project, however, where the water supply is very short, the average yield of alfalfa is only 2.4 tons per acre, while on the Satus Division, where the water supply is generally plentiful, the average yield is 4.05 tons per acre.

Harvesting and Marketing

Practically all of the alfalfa on the project is stacked on the farm. Occasionally a crop is baled out of the field, but such instances are so rare that they need not be considered as a significant practice in the alfalfa production program. Stacking is done almost universally in the valley by means of hay sleds, slings, and a home-made swing derrick. The soil is too sandy and loose to permit the use of bull-rakes, sweep-rakes, push-rakes, and overshot stackers. Apparently the farmers neither care nor try to build good haystacks. The hay on most farms is piled up in almost any fashion just to get it off the field. It is quite common to hear the expression "the typical Yakima Valley haystack" in describing or referring to an irregularly-shaped, careless-looking pile of hay. While this practice probably has no bearing on the actual yields, it does affect the final returns from the crop and may have a tendency to reduce the reported yields, since many farmers, if not most of them, report their yields on the basis of the amount of hay baled out of their stacks rather than the total amount produced.

There is a growing demand in the valley for green, leafy, properly cured alfalfa hay, and a few farmers are attempting to meet this demand. Poultry and dairy organizations offer a premium for green, leafy, hay;

The Alfalfa Situation, etc. (cont'd)

and if this demand continues to increase, it may have an effect on the methods of curing the crop. The side-delivery rake, which can be used immediately behind the mower, seems to be an improvement because by this method the hay is cured in the windrow instead of in the swath and, theoretically at least, more leaves are retained.

It is estimated* that at the present time about 60 per cent of the alfalfa grown in the valley is shipped out: 50 per cent as baled hay and 10 per cent as meal. The remaining 40 per cent is fed locally. Probably these ratios should be reversed or, better still, almost 100 per cent of the alfalfa crop should be fed or made into meal on the project. The large quantity of alfalfa which is shipped out each year without returning anything to the soil in the way of animal manure may be responsible in part for the declining yields in certain parts of the project.

Yields

The only available records of alfalfa yields in the valley which cover more than a 5-year period are those found in the annual crop census of the Bureau of Reclamation. These yields together with the acreage each year are given in Table 2. This table shows that the average yield has declined steadily from 6 tons per acre in 1910 to 3.5 tons per acre in 1929. The maximum yields, however, do not show any regular decline.

Table 2.- Yields of alfalfa hay from 1910 to 1929, inclusive, on the Sunnyside Division of the Yakima Project.

Year	Area, acres	Total yields tons	Yields in tons per acre		
			Maximum	Minimum	Average
1910	20,630	-----	---	----	6
1911	25,064	-----	---	----	6
1912	24,338	133,853	8	3	5.5
1913	24,137	120,685	8	3	5
1914	26,164	130,820	8	3	5
1915	26,042	104,168	7.5	1	4
1916	28,316	135,917	7.5	1	4.8
1917	31,678	143,551	8	1	4.5
1918	36,516	157,020	10	1	4.3
1919	41,370	175,822	7	1	4.25
1920	45,541	193,549	8	1	4.25
1921	41,534	176,520	12	1	4.25
1922	37,177	143,919	8.5	1	4
1923	37,841	150,438	10	.5	4.5
1924	38,033	140,297	10	.3	3.7
1925	32,598	108,081	8.5	.5	3.3
1926	31,725	118,668	9	.75	3.7
1927	30,056	104,935	9	1	3.5
1928	28,815	98,444	7.4	.3	3.4
1929	28,756	99,675	7	.5	3.5

*This estimate is based on figures of car-lot shipments compiled by the Yakima Morning Herald from railroad records and market reports.

The Alfalfa Situation, etc. (cont'd)

To supplement this information the following letter and questionnaire were prepared this year in cooperation with the local office of the Bureau of Reclamation and sent from the Sunnyside office to the water-users in four of the principal alfalfa-growing districts of the project.

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Reclamation

Yakima Project

October 15, 1929.

To Water Users,
Yakima Project.

There has been in recent years considerable complaint concerning the decreasing yields of alfalfa hay under this project.

A number of causes have been held to account for these decreased yields. In order to suggest any remedy, it is first necessary to determine more accurately the predominating causes.

The United States Department of Agriculture, through the Prosser Experiment Station, proposes to undertake a study of this matter, covering the next several years. The local Bureau of Reclamation is cooperating in gathering some of this information.

The attached list of questions has been prepared in an attempt to bring out some points connected with this question of alfalfa hay production. It will be appreciated if you will cooperate with us by filling out the answers to the enclosed questions and hand it to the ditch-rider when he takes up the annual crop census.

Yours very truly,

(Signed) Porter J. Preston
Superintendent.

ALFALFA HAY CENSUS

1. How long have you grown alfalfa on your land?
2. How many acres 1914 to 1918? 1919 to 1924?
1929?
3. What variety? (Common, Grimm, or other)
4. At what stage of bloom do you cut?
5. How many cuttings?
6. What methods of weed and cheat control do you practice?
7. Yields per acre when land was first cropped.
8. How much per acre at present?
9. How old is your present stand of alfalfa?
10. How long does alfalfa ordinarily occupy the same land on your farm?
11. Is your alfalfa on your best, medium, or poorest land?
12. Is land level, gentle slope, or steep?
13. If yields have declined, what in your judgment is the cause?
14. Do you use fertilizer? If so, kind and extent of use?
15. (a) Do you mark out for irrigation/each cutting, or only in the
spring?
(b) What is the average distance of run from your head ditch in
rods or feet?

The Alfalfa Situation, etc. (cont'd)

16. Do you give your alfalfa the amount of water you think will produce maximum results? Explain.
17. How often have you applied water this year?
18. Do you practice fall irrigation?
19. Does your alfalfa land sub-irrigate? Extent of same?

Name _____

NOTE:

Use reverse side for any explanation you wish to make on the subject.

An area of about 8,000 acres was represented in this survey, but only a small number of the questionnaires were returned; so that the information obtained this year applies to only 2600 acres. It is planned to continue the survey for several years. Out of 150 farms thus reporting on the alfalfa situation the average yields have declined since the land was first cropped from 5.6 to 4.16 tons per acre. But of these 2587 acres of alfalfa 1487 acres were on medium land and 1100 acres on the best land. The following table shows the average yields obtained from each district on the project. This and additional information brought out by these questionnaires will be discussed under the topic "Causes of Apparent Decline in Yields."

Table 3.- Average yields of alfalfa and proportion grown on medium and best land in certain localities on the Sunnyside Division of the Yakima Project, 1929.

Districts	Number of farms reporting	Acres of alfalfa reported	Average yields		Total acres on	
			When first cropped	At present	Medium land	Best land
			tons	tons		
Granger	41	842	5.6	4.3	681	160
Outlook	31	490	6.2	3.9	154	336
Sunnyside	4	105	7.0	4.5	50	55
Emerald	23	585	5.9	3.8	222	363
Mabton	15	155	5.2	4.4	128	28
Prosser	33	410	5.3	3.6	252	158

All districts	147	2,587	5.6	4.16	1,487	1,100

Careful records of yields of alfalfa have been kept on the Prosser Experiment Station for the last nine years, and no decline in yields is apparent. Table 4 shows these yields for one of the common varieties grown throughout the valley and also for Grimm. It will be noticed that the eight-year average yield is 6.66 tons and that the yield for 1929 was 6.76 tons. It is also significant that the common variety yielded an average of about $\frac{1}{2}$ ton more than Grimm. It may be that manure has helped to maintain yields on the station, but it is believed that adequate weed control and proper irrigation methods have been equally important. The only field that had been in alfalfa previously was E-1.

The Alfalfa Situation, etc. (cont'd)

Table 4.- Alfalfa yields on Prosser Experiment Station from 1921 to 1929, inclusive.

Year	Fields	Age of stand	Yields in tons per acre	
			Common	Grimm
1921	A-7	Second year	6.79	----
1922	E-5a	First year	7.17	6.23
1923	E-5a ₁	Second year	6.65	6.33
1924	A-2 ₁	First year	7.56	7.29
1925	A-2	Second year (manured)	6.18	5.39
1926	A-2	Third year	6.67	6.28
1927	A-2 ₁	Fourth year	7.03	6.21
1928 ^{2/}	E-1 ₁	First year	5.30	4.86
1929	E-1	Second year	6.76	6.17
Eight-year average 1922-1929, incls.			6.66	6.09

1/ Fields A-2 and E-1 received manure one or more years before being planted to alfalfa; the other fields did not.

2/ The average yield of alfalfa on E-1 from 1920 to 1923 was 6.5 tons per acre.

Causes of Apparent Decline in Yields

Some observers wonder whether this decline in yields is real or imaginary, and there seem to be certain psychological influences which tend at least to exaggerate this decline. These will be discussed later. The actual causes, most of which were reported in the questionnaires, which seem to be contributing to the situation are as follows:

1. Decrease in soil fertility.
2. Weeds and grass competition.
3. Insufficient water.
4. Poor seed.
5. Poor varieties.
6. Pests and diseases.
7. Pasturing too closely.
8. Poor care.
9. Ground-water and alkali.
10. A shift in the alfalfa acreage.
11. Certain psychological reactions which may affect crop reports.

Each of these causes will be briefly discussed in the order in which they are enumerated.

Decrease in soil fertility.- There is very little, if any, positive evidence available that the general fertility of the soil of this project has been decreased as far as the production of alfalfa is concerned. Applications of commercial fertilizers containing nitrogen, phosphorus, potash, calcium, and sulphur were made singly and in combination with each other by H. P. Singleton on various fields in different parts of the project during several years, and none of them had any noticeable effect. It has been well demonstrated at the Prosser Station

The Alfalfa Situation, etc (cont'd)

and elsewhere that this soil is deficient in nitrogen and that the yields of crops other than legumes decrease the second, third, or fourth year after a legume crop has been grown. But a deficiency of nitrogen and organic matter is not ordinarily associated with the low yields of alfalfa since it is known that alfalfa gets its nitrogen from the air and fixes it in the soil. Furthermore, there are many farms on the project that have been cropped to alfalfa alternately with other crops for 25 years or more which are producing six or seven tons of alfalfa per acre per year at the present time, and this is probably as much as they ever produced.

Weeds and grass competition.- Cheat (Bromus tectorum) is the most serious weed the alfalfa grower has to contend with in this locality. It is very prevalent throughout the valley. There are few if any fields on the project that have been in alfalfa more than four or five years which are not badly infested with this weed. In addition to this, there is a small amount of dodder, a slightly larger amount of blue grass, quack grass, Johnson grass, etc. which reduce the yields wherever they are present. These weeds can be and are controlled on the better farms throughout the project.

Insufficient water.- The lack of water for alfalfa is most pronounced on some of the auxiliary units of the project which are under pumping plants. The average allotment for these areas is 3 acre-feet per acre. Yields of six tons per acre probably require from 1 to 1½ acre-feet more than this.* There are also other areas of sandy or gravelly land where the scarcity of water is a serious problem. Water-users under the main canal can buy excess water if it is available at the rate of \$1.50 per acre-foot. But where the soil is very porous from 5 to 6 acre-feet are needed, and the cost of excess water sometimes becomes an important item. Only a small area of the project is on this type of land. In addition to this, there are many farms where potatoes are the chief crop, yet half of the farm may be devoted to alfalfa. But during July and August when potatoes must have a lot of water the alfalfa has to suffer and as a result the yields are reduced.

Poor seed.- A number of alfalfa men claim that they are unable to get a good stand after they have once plowed up the crop. They attribute this largely to the quality of the seed which is sold by the dealers throughout the valley. It is said that the seed which was obtainable here in the early days has degenerated in quality, having been mixed with weaker strains and undesirable varieties. Any reliable proof of these claims is difficult to find. On the contrary, a number of lawsuits brought against local seed dealers on this and similar claims have been decided, upon expert testimony, in favor of the dealers.

Poor varieties.- It is possible that enough alfalfa of such varieties as Turkestan and Peruvian is being grown to affect the total yield on the project to a slight extent. The two varieties mentioned and several others were consistently low yielders in the varietal trials at this station. As is shown in Table 4, Grimm seems to yield less in this valley than the common varieties, and due to advertising and salesmanship a certain amount of it has been planted here.

*Unpublished data obtained at the Prosser Experiment Station.

The Alfalfa Situation, etc. (cont'd)

Pests and diseases.- No widespread or common alfalfa diseases have been identified on the project. There is a little talk of bacterial wilt and root rot, but no serious injury has been found from these diseases. There is evidence, however, of some damage being done by the alfalfa eelworm. In 1924 Mr. F. D. Bailey, of the Office of Cotton, Truck, and Forage Crop Disease Investigations, Bureau of Plant Industry, made a survey of this situation in the Yakima Valley. He found eelworm infestations in nearly every field he examined throughout the valley, and in some localities it was fairly obvious that the damage was sufficiently extensive to reduce yields. His final conclusion, however, was that on the whole this nematode was not at that time a serious pest to alfalfa production on this project. One other pest, the wireworm, is a cause of some concern to alfalfa growers. Where the potato land becomes so badly infested with wireworms that potato growing has to be abandoned, the land is sown to alfalfa, but the worms are so plentiful for the first year or two at least that they interfere somewhat with its proper growth. These two pests, the alfalfa eelworm and the wireworm, are the only ones which have been reported as having any injurious effect on the crop as a whole.

Pasturing too closely.- Pasturing alfalfa in the fall with sheep is practiced to a limited extent on the project, and where very close grazing is permitted it is thought that the yields are affected adversely the following year. Pasturing is not extensive, however, and it is not known whether more is done at the present time than formerly. It may be that the manure dropped on the land during pasturage offsets the damage done, if any, by close grazing.

Poor care.- On a number of farms alfalfa is grown only as a rotational crop. It is not considered particularly profitable itself but is grown as a soil rejuvenator or to get rid of weeds. Where this is the case it is possible that it does not receive the care and attention it did when it was the first or practically the only crop grown. Out of the 147 farmers who answered the questionnaire previously referred to, ten ascribed poor care and neglect as the cause of their low yields. This is only about 6-3/4 per cent, but it may be that a considerably larger number would attribute low yields to the same cause if a disinterested report were obtainable.

Ground-water and alkali.- There are approximately 20,000 acres of land on this project which have been damaged by ground-water and alkali. This is about one-fifth of the entire area. Some of this has been partially reclaimed, but when alfalfa is grown on such damaged land the yields are considerably below normal. A large part of this land injured by alkali was once the most productive on the project. It is said to have been largely cropped to alfalfa. This is probably one of the chief causes for a lower average yield of alfalfa on the project as a whole than was produced 20 or 25 years ago when the alkali area was much smaller.

A shift in the alfalfa acreage.- When the project was first settled and the land was first cropped, alfalfa was of necessity one of the first crops grown because of the nature of the soil. It is very likely, therefore, that at that time alfalfa occupied the very best land which was being farmed. But as other profitable crops, such as fruit and potatoes, were introduced and established, the alfalfa was pushed onto the poorer land. Table 3 shows that at present about two-

The Alfalfa Situation, etc. (cont'd)

thirds of the alfalfa is on medium or poor land and about one-third on the best land.

At the present time, according to the 1929 crop reports, there are 11,695 acres of fruit on the project, 6,871 acres of potatoes, and about 2,000 acres of such crops as hops, asparagus, rutabagas, etc., making a total of 20,566 acres of choice land which was undoubtedly at one time in alfalfa and which perhaps is capable of producing more alfalfa per acre than any other land on the project.

Certain Psychological Reactions Which May Affect Crop Reports

In the early days of the project when the land was first opened and just coming under production there was perhaps something of a boom feeling throughout the community. The farmer was pleased with his first crop and enthusiastic about the productiveness of his land. He was anxious to see the value of the land increase. He had not yet felt the burden of high taxes and water assessments. Hence when the ditch-rider asked him about his yields his natural tendency was to report them high. But at the present time when all the newspapers are filled with stories of the farmer's distress and his unequal share in the prosperity of the country, together with his high taxes, local improvement assessments, road assessments, school district assessments, water assessments, drainage assessments, and high production costs, the highest yields look pretty small to him and his inclination is to report them below what they really are.

In addition to this, there are a considerable number of tenant farmers, the real owners in many cases being residents of other states. On the neighboring Wapato Indian Reservation Project, which is just across the river, the largest portion of the land is farmed by renters who obtain their leases from the Indian Service by competitive bidding. The lessees say that if high yields of crops are reported from this land, the rent immediately goes up because of higher bidding for the next period of lease. Hence low yields are reported even where high yields are produced. This practice is thought to be followed to some extent on the Sunnyside Division. It is carried over as a matter of habit on the part of some renters who have come from the reservation, although the basis and motives for reporting the low yields are not so clearly defined.

Summary

To sum up the situation with respect to the decline of alfalfa yields, it seems there is a possibility that the yields as reported in the annual crop census of the Bureau of Reclamation may exaggerate this decline. It will be remembered that the questionnaire report showed an average decline of about one ton per acre instead of $2\frac{1}{2}$ tons per acre as shown by the crop census, and the yields during a 9-year period on the Experiment Station showed no decline at all. It is evident, however, that a certain falling off in yield has taken place, and it is thought to be due to a combination of the causes set forth rather than to any one cause. It is not believed that there has been any material decrease in the soil fertility or that the general productivity of the land has been impaired except on the areas which have been damaged by the rise of the ground-water and subsequent accumulations of alkali salts.

C. C. Wright.

W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

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No. 5

LAMB-FEEDING EXPERIMENTS, 1929-1930
Belle Fourche Field Station

These experiments were conducted in cooperation with the South Dakota State College of Agriculture to obtain information on the feeding value of home-grown feeds and the by-products of the sugar beet industry, and also to find how these feeds can be combined with such feeds as may be shipped in to yield the most profitable return. For this purpose 546 range lambs, averaging 64 pounds each in weight, were bought at 12 cents per pound. They were divided into 14 lots of 39 lambs each, and were fed the following rations:

- Lot 1. Dry pulp and alfalfa hay.
- " 2. Dry pulp 5 parts, cottonseed cake 1 part, and alfalfa hay.
- " 3. Barley and alfalfa hay.
- " 4. Oats and alfalfa hay.
- " 5. Corn and alfalfa hay.
- " 6. Pressed pulp, cottonseed cake, and alfalfa hay.
- " 7. Pressed pulp and alfalfa hay.
- " 8. Pressed pulp, molasses, and alfalfa hay.
- " 9. Pressed pulp 60 days, finished with barley, cottonseed cake, and alfalfa hay.
- " 10. Barley 5 parts, cottonseed cake 1 part, and alfalfa hay.
- " 11. Corn 5 parts, cottonseed cake 1 part, and alfalfa hay.
- " 12. Corn 5 parts, linseed meal 1 part, and alfalfa hay.
- " 13. Dry pulp $2\frac{1}{2}$ parts, barley $2\frac{1}{2}$ parts, cottonseed cake 1 part, and alfalfa hay.
- " 14. Dry pulp 5 parts, linseed meal 1 part, and alfalfa hay.

These rations have now been used for two years and some for three years, and the feed requirements per hundred pounds of gain on the different rations are fairly constant. The same rations will be continued for another year and if the results are similar to those previously obtained, an average of the three years should indicate what may be expected where like rations are used.

The test was started this year on October 16 and continued until February 17, a total of 124 days. All the lots were fed all the alfalfa hay they would eat through panels twice a day. The grain, pulp, and molasses were fed in separate yards, morning and evening. All the lots had access to water at all times through automatic waterers, and salt was available in boxes in each pen. The ration of grain and dry pulp was started at one-fourth pound per lamb per day and was gradually increased to three-fourths pound at the end of 30 days, one pound at the end of 60 days, $1\frac{1}{2}$ pounds at the end of 90 days, and at the end of the feeding period each lamb was consuming $1\frac{3}{4}$ pounds per day. At the end of the feeding period $1\frac{1}{2}$ pounds of dry pulp in lot 1 and $1\frac{1}{2}$ pounds of dry pulp and linseed meal in lot 14 seemed to be the limit that each lamb would consume per day. The lots fed pressed pulp were started at one pound per day and gradually increased to 3 pounds, which was all they

1. The first part of the paper is devoted to a general discussion of the problem.

2. The second part is devoted to a detailed analysis of the results obtained.

3. The third part is devoted to a discussion of the results obtained in the context of the general theory.

4. The fourth part is devoted to a discussion of the results obtained in the context of the general theory.

5. The fifth part is devoted to a discussion of the results obtained in the context of the general theory.

6. The sixth part is devoted to a discussion of the results obtained in the context of the general theory.

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12. The twelfth part is devoted to a discussion of the results obtained in the context of the general theory.

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15. The fifteenth part is devoted to a discussion of the results obtained in the context of the general theory.

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21. The twenty-first part is devoted to a discussion of the results obtained in the context of the general theory.

22. The twenty-second part is devoted to a discussion of the results obtained in the context of the general theory.

Belle Fourche (cont'd)

would consume for the first 30 days. Then the pressed pulp was gradually increased so that at the end of the feeding period from 5 to 6 pounds per day was being consumed. In lot 8 one-fourth pound of molasses per day was fed at first and this was gradually increased to one-half pound in 30 days and continued at this rate for the rest of the feeding period. Lot 9 was fed pressed pulp, cottonseed cake, and alfalfa for the first 60 days and then gradually changed to a grain ration of barley and cottonseed cake. Where cottonseed cake was used in combination with pressed pulp, it was fed at the same rate as in a grain ration. When one pound of grain mixture was fed, the lots fed pressed pulp received one-sixth pound of cottonseed cake.

On February 17 when the experiment was completed, the lambs were weighed. They were appraised by Ray Lupke, sheep salesman, John Clay & Co., Sioux City, Iowa, as follows:

Lot 1	\$10.75	per	hundred	Lot 28	\$11.00	per	hundred
" 2	10.75	"	"	Lot 9	10.75	"	"
" 3	10.75	"	"	" 10	10.50	"	"
" 4	10.85	"	"	" 11	10.00	"	"
" 5	10.00	"	"	" 12	10.00	"	"
" 6	11.00	"	"	" 13	10.50	"	"
" 7	8.50	"	"	" 14	10.50	"	"

Due to the glutted condition of the market, the heavier lambs were discriminated against on account of weight in spite of the fact that they had a much better finish. This put the better feeds at a disadvantage as compared with previous years. The lambs were shipped on February 21 and sold on the Sioux City market February 25 at \$10.00 per hundred. The average appraised value a week earlier was \$10.42, but the market was fully 50 cents lower when the lambs were sold. The average shrinkage between the feedlot and Sioux City was $8\frac{1}{2}$ pounds as against 7 pounds the previous year. This heavy shrinkage was probably due to the fact that the lambs were held over until Tuesday before they were sold and weighed. The butchering data could not be obtained this year. The freight and marketing charge, using double-deck cars, was 65 cents per head. The cause of the feedlot death loss, amounting to 2 per cent or an average of 15 cents per lamb, is not known and could not be attributed to any particular feed.

The following table shows in detail the results obtained in this year's experiment.

Belle Fourche (cont'd)

Item	Dry pulp, alfalfa	Dry pulp, cotton- seed cake, alfalfa	Barley, alfalfa	Oats, alfalfa	Corn, alfalfa	Pressed pulp, cotton- seed cake, alfalfa	Pressed pulp, alfalfa
Lot No.	1	2	3	4	5	6	7
Number of lambs in lot	39	39	39	39	39	39	39
Initial weight (av.) lbs	64.21	64.49	64.74	64.49	63.95	64.21	64.21
Final weight (av.) "	88.05	97.56	97.38	94.62	99.49	91.62	85.92
Gain per lamb "	23.84	33.07	32.64	30.13	35.54	27.41	21.71
Feed required per 100 pounds gain:							
Dry pulp lbs.	552	350	---	---	---	---	---
Pressed pulp "	---	---	---	---	---	2,156	2,722
Cottonseed cake "	---	70	---	---	---	99	---
Linseed meal "	---	---	---	---	---	---	---
Barley "	---	---	439	---	---	---	---
Oats "	---	---	---	472	---	---	---
Corn "	---	---	---	---	385	---	---
Molasses "	---	---	---	---	---	---	---
Alfalfa "	1103	764	782	871	705	997	1269
Feed cost per 100 pounds gain \$	11.31	9.45	8.96	9.78	10.07	10.43	9.74
Initial cost of lamb \$	7.71	7.74	7.77	7.74	7.67	7.71	7.71
Feed cost per lamb \$	2.70	3.13	2.92	2.95	3.57	2.86	2.11
Interest \$	.20	.20	.20	.20	.20	.20	.20
Death loss, 2% \$	.15	.15	.15	.15	.15	.15	.15
Freight & marketing \$	.65	.65	.65	.65	.65	.65	.65
Total cost per lamb \$	11.41	11.87	11.69	11.69	12.24	11.57	10.82
Final weight at feed yard (av.) lbs.	88.05	97.56	97.38	94.62	99.49	91.62	85.92
Shrinkage to Sioux City (av.) lbs.	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Selling weight "	81.05	90.56	90.38	87.62	92.49	84.62	78.92
Selling price per cwt., appraised \$	10.75	10.75	10.75	10.85	10.00	11.00	8.50
Receipts per lamb \$	8.71	9.74	9.72	9.51	9.25	9.31	6.71
Loss per lamb \$	2.70	2.13	1.97	2.18	2.99	2.26	4.11

The above feed costs are based on the following prices: Corn \$1.70 per cwt., oats \$1.15 per cwt.; barley \$1.15 per cwt., dry pulp \$1.05 per cwt., pressed pulp \$2.50 per ton, cottonseed cake \$2.78 per cwt., linseed meal \$3.35 per cwt., molasses 75 cents per cwt., and alfalfa hay \$10.00 per ton. The original cost of the lambs was 12 cents per pound.

Belle Fourche (cont'd)

(Table cont'd from preceding page)

Item	Pressed pulp, molasses, alfalfa	Pressed pulp 1st 60 days, barley, cotton- seed cake, alfalfa	Barley cotton- seed cake, alfalfa	Corn, cotton- seed cake, alfalfa	Corn, linseed meal, alfalfa	Dry pulp, barley, cotton- seed cake alfalfa	Dry pulp, linseed meal, alfalfa
Lot No.	8	9	10	11	12	13	14
Number of lambs in lot	39	39	39	39	39	39	39
Initial weight (av.) lbs	64.21	64.49	64.49	64.49	64.21	64.46	63.95
Final weight (av.) "	87.18	94.92	93.21	100.82	100.26	99.23	97.85
Gain per lamb "	22.97	30.43	33.72	36.33	36.05	34.77	33.90
Feed required per 100 pounds of gain:							
Dry pulp lbs.	---	---	---	---	---	169	329
Pressed pulp "	2539	716	---	---	---	---	---
Cottonseed cake "	---	68	71	63	---	68	---
Linseed meal "	---	---	---	---	65	---	66
Barley "	---	261	354	---	---	169	---
Oats "	---	---	---	---	---	---	---
Corn "	---	---	---	317	327	---	---
Molasses "	221	---	---	---	---	---	---
Alfalfa "	1131	833	765	723	713	751	745
Feed cost per 100 pounds gain	\$ 10.52	9.95	9.86	10.75	11.30	9.36	9.38
Initial cost of lamb \$	7.71	7.74	7.74	7.74	7.71	7.74	7.67
Feed cost per lamb \$	2.42	3.03	3.32	3.91	4.07	3.25	3.18
Interest \$	.20	.20	.20	.20	.20	.20	.20
Death loss, 2% \$	.15	.15	.15	.15	.15	.15	.15
Freight & marketing \$	.65	.65	.65	.65	.65	.65	.65
Total cost per lamb \$	11.13	11.77	12.06	12.65	12.78	11.99	11.85
Final weight at feed yard (av.) lbs.	87.18	94.92	93.21	100.82	100.26	99.23	97.85
Shrinkage to Sioux City (av.) lbs.	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Selling weight "	80.18	87.92	91.21	93.82	93.26	92.23	90.85
Selling price per cwt., appraised \$	11.00	10.75	10.50	10.00	10.00	10.50	10.50
Receipts per lamb \$	8.82	9.45	9.58	9.38	9.33	9.68	9.54
Loss per lamb \$	2.31	2.32	2.48	3.27	3.45	2.33	2.31

The above feed costs are based on the following prices: Corn \$1.70 per cwt., oats \$1.15 per cwt., barley \$1.15 per cwt., dry pulp \$1.05 per cwt., pressed pulp \$2.50 per ton; cottonseed cake \$2.78 per cwt., linseed meal \$3.35 per cwt., molasses 75 cents per cwt., and alfalfa hay \$10.00 per ton. The original cost of the lambs was 12 cents per pound.

Belle Fourche (cont'd)

Comparing the different feeds used in each ration with the corn, the results are as follows: In lot 5 it required 335 pounds of corn and 705 pounds of alfalfa hay to make 100 pounds of gain. Comparing corn and cottonseed cake in lot 11, it required 82 pounds of corn and 16 pounds of cottonseed cake to equal 100 pounds of corn, or at a cost of 16 cents more than corn. Lot 1 required 143 pounds of dry pulp and 103 pounds of alfalfa hay to equal 100 pounds of corn at a cost of 32 cents above corn. Lot 2 required 91 pounds of dry pulp, 18 pounds of cottonseed cake, and 15 pounds of alfalfa hay to equal 100 pounds of corn at a cost of 17 cents less than corn. Lot 3 required 114 pounds of barley and 20 pounds of alfalfa hay to equal 100 pounds of corn, which was 26 cents cheaper than corn. In lot 4 123 pounds of oats and 43 pounds of alfalfa hay equalled 100 pounds of corn and cost 7 cents less than corn. Lot 6 required 560 pounds of pressed pulp, 26 pounds of cottonseed cake, and 76 pounds of alfalfa hay to equal 100 pounds of corn and cost 10 cents more than corn. In lot 7 707 pounds of pressed pulp and 146 pounds of alfalfa hay equalled 100 pounds of corn and cost 9 cents less than corn. Lot 8 required 667 pounds of pressed pulp, 57 pounds of molasses, and 111 pounds of alfalfa hay to equal 100 pounds of corn and cost 12 cents more than corn. In lot 9 68 pounds of barley, 183 pounds of pressed pulp, 18 pounds of cottonseed cake, and 16 pounds of alfalfa hay equalled 100 pounds of corn and cost 2 cents less than corn. Lot 10 required 92 pounds of barley, 18 pounds of cottonseed cake, and 12 pounds of alfalfa hay to replace 100 pounds of corn and cost 6 cents less than corn. In lot 12 85 pounds of corn, 17 pounds of linseed meal, and 2 pounds of alfalfa hay replaced 100 pounds of corn and cost 32 cents more than corn. Lot 13 required 44 pounds of dry pulp, 44 pounds of barley, 18 pounds of cottonseed cake, and 12 pounds of alfalfa hay to equal 100 pounds of corn and cost 17 cents less than corn. In lot 14 85 pounds of dry pulp, 17 pounds of linseed meal, and 10 pounds of alfalfa hay equalled 100 pounds of corn and cost 18 cents less than corn.

Table comparing amounts of different feeds required to equal 100 pounds of corn as fed in the 1929-30 lamb-feeding experiment.

Lot. No.	Dry pulp	Barley	Oats	Pressed pulp	Corn	Molasses	Cottonseed cake	Linseed cake	Alfalfa hay	Feed cost above or below value of 100 pounds of corn
1	143	--	--	---	--	--	---	--	103	\$0.32
2	91	--	--	---	--	--	18	--	15	.17*
3	--	114	--	---	--	--	--	--	20	.29*
4	--	--	123	----	--	--	--	--	43	.07*
5	--	--	--	--	100	--	--	--	30	.00
6	--	--	--	560	--	--	26	--	76	.10
7	--	--	--	707	--	--	--	--	146	.09*
8	--	--	--	667	--	57	--	--	111	.13
9	--	68	--	186	--	--	18	--	33	.02*
10	--	92	--	---	--	--	18	--	16	.06*
11	--	--	--	---	82	--	16	--	5	.16
12	--	--	--	---	85	--	--	17	2	.32
13	44	44	--	---	--	--	18	--	12	.17*
14	85	--	--	---	--	--	--	17	10	.19*

*Denotes feed cost below value of 100 pounds of corn.

Belle Fourche (cont'd)

(The following note refers to the table on the preceding page)
Prices used are as follows: Corn \$1.70 per cwt., barley and oats \$1.15 per cwt., dry pulp \$1.05 per cwt., pressed pulp \$2.50 per ton; linseed cake \$3.35 per cwt., cottonseed cake \$2.78 per cwt., and alfalfa hay \$10.00 per ton.

Cottonseed cake and linseed meal as used in the different rations have about equal feed value pound for pound. The one to use depends on the price at which they can be bought. At the prices used in this table the addition of cottonseed cake or linseed meal to a corn or barley ration increased the cost of gain, but the lambs had a better finish. The addition of cottonseed cake or linseed meal to a dry pulp ration decreased the cost of gain and produced a better finished lamb. Dry pulp has about the same feed value as barley when fed without a concentrate and a somewhat higher value when supplemented with cottonseed cake or linseed meal. Dry pulp made better gains than pressed pulp both with and without a supplement of cottonseed cake or linseed meal. In comparing the relative values of corn, barley, and dry and pressed pulp when fed with a concentrate, the cottonseed cake and linseed meal have a much higher feed value in the pulp rations than with either corn or barley. Pressed pulp can be used to advantage during the first half of the fattening period when supplemented with cottonseed cake or linseed meal followed by barley or corn.

On this year's operations all lots show a financial loss, but this was due to the lambs being bought for 12 cents a pound at Newell and charged out at .10.48 on the Sioux City market. To take care of the freight and marketing charge, shrinkage, death loss, and interest, a two-cent margin on feeder lambs is necessary between Belle Fourche Valley points and Sioux City, Iowa.

Beyer Aune.

Newlands

It has been some time since a report on the work at this station has appeared in these columns. During the winter months, as a rule, it is necessary to curtail the greater part of the field work. However, this winter has been one of exceptional activity.

Last summer plans were made to make several changes in the series of rotation-plots. This work was started last October. The station purchased one horse, hired four more and a six-horse wheeled scraper, which enabled us to run the scraper to capacity and also have horses for the usual farm work. The following work has been done on these plots:

(1) G series releveled and enlarged; (2) southern ends of J-1, 2, and 3 raised about 4 inches with good dirt; (3) plots B-20, 21, and 22 raised several inches to give proper fall and drainage; (4) the rotation series C, D, and E have been torn up, plots enlarged, ditches straightened, and entire area raised, making a uniform field.

The increased demands for heating apparatus in the laboratory necessitated a change in the system of electric wiring on the station. The mess house, bunk house, office, and laboratory were rewired with heavier wire and additional outlet boxes installed. The former milk testing room has been equipped for the work of boron analysis. It has been made as nearly fire-proof as possible.

Newlands (cont'd)Alfalfa Yields on Newlands Field Station in 1929

Plots	Area, acres	Yield per acre		Total yield, pounds
		Pounds	Tons	
B	5.19	8,049	4.02	41,775
D-1	.28	3,875	3.44	1,925
-2	.32	8,635	4.31	2,760
-5	.57	4,649	2.32	2,650
-6	.54	6,741	3.37	3,640
F-1	.52	5,462	2.73	2,840
-2	.52	5,846	2.92	3,040
-3	.52	7,981	3.99	4,150
-4	.52	7,087	3.54	3,685
-7	.52	6,923	3.46	3,600
G1-5	1.90	8,253	4.13	15,680
H-1	.40	8,150	4.08	3,260
-2	.40	6,638	3.32	2,655
-3	.40	12,013	6.01	4,805
-4	.40	11,588	5.79	4,635
-5	.40	9,888	4.94	3,955
6-12	2.10	6,698	3.35	14,065
J-1	.49	3,745	1.87	1,835
-2	.49	4,796	2.40	2,350
-3	.49	5,725	2.86	2,805
-4	.49	8,449	4.22	4,140
-5	.49	8,286	4.14	4,060
-6	.49	8,724	4.36	4,275
-7	.49	8,653	4.53	4,240
-8	.49	9,765	4.88	4,785
-9	.49	11,194	5.60	5,485
-10	.49	12,489	6.21	6,090
-11	.49	11,327	5.66	5,550
-12	.49	10,204	5.10	5,000
-13	.49	10,143	5.07	4,970
-14	.49	10,561	5.28	5,175
Y- 2	.45	5,278	2.64	2,375
- 3	.45	8,444	4.22	3,800
- 4	.45	6,333	3.17	2,850
- 5	.45	4,867	2.43	2,190
-11*	.45	4,044	2.02	1,820
-12*	.45	4,533	2.27	2,040
-13	.45	5,056	2.53	2,275
-14	.45	4,200	2.10	1,890
-15*	.45	2,833	1.42	1,275
-16*	.45	2,356	1.18	1,060
-17*	.45	956	.48	430

Total	25.06	---	---	195,260
Average	---	7,792	3.90	---

*Sweet clover plots; yields not used in total averages.

Hewlands (cont'd)

Not much laboratory work has been done at this station since last December when Mr. Moon, the chemist, was transferred temporarily to the Limoneira Laboratory; but it is expected that he will return soon and take up the boron work and that in a few months enough analyses will have been made to draw some definite conclusions as to the boron content of the underground water and subsoil of the farm area.

During the last two months much time has been devoted to compiling data and writing the detailed report. Each year an improvement is noted in the farming conditions and farm returns at the station.

Three years of records on the dairy herd being maintained at the station by the State of Nevada were finished last January. At that time it was decided to try to obtain some information on the cause of sterility among dairy cows. A great deal of breeding trouble has been experienced at this station and on the project. The trouble was especially prevalent among young heifers. All cows that had shown a positive reaction to abortion blood tests were eliminated from the herd on January 1. Nine mature cows were sold, no reaction being found among the younger stock. A state veterinarian has been detailed to conduct thorough examinations of all cows in the dairy herd at least twice a month. After ridding the herd of all cows with some organic trouble that would cause sterility, we shall make tests on the rest of the herd with various feeds, methods of handling, and treatments that might prevent or cause sterility.

The results from the use of manure on corn and superphosphate on wheat following on the same land are now available for a 12-year period. This procedure has continued to show increased yields. There has been an average yearly increase of 483 pounds per acre in the yields of wheat. The manured corn plots have yielded an average of 2,928 pounds (green weight) per acre more than the unmanured plots.

E. W. Knight.

San Antonio

Report for the three-week period ending March 1

The maximum temperatures for the month of February were not excessive, but owing to the relatively high mean minimum temperatures and the absence of any periods of extreme cold, the mean temperature for the month was 5.3 degrees above the average mean for February during the preceding 23 years. The minimum temperature for the past month was 32. This is the highest absolute minimum for February ever recorded at this station.

A measurable amount of precipitation was recorded for six separate days, with a total for the month of only .76 inch. The average February precipitation for the preceding 23 years is 1.63 inches. Nine days of the month were cloudy, 12 partly cloudy, and 7 days were clear. Notwithstanding the high mean temperature, the evaporation from a free surface was only 2.45 inches—.60 inch less than normal. This relatively small amount of evaporation was due to lack of sunshine and subnormal wind movement. The average wind velocity for February was 5.7 miles per hour as compared with a normal of 4.1 miles per hour.

San Antonio (cont'd)

A summary of the climatological data for the three weeks
and for the month of February

Week ending	Temperature					G. D. R.	Pre- cipita- tion, inches	Aspect of the sky		
	Maximum		Minimum		Mean			Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
								days	days	days
Feb. 15	83	74.6	34	50.3	62.4	31	.22	0	5	2
" 22	86	73.7	32	48.3	61.0	54	--	3	2	2
Mch. 1	84	71.6	40	50.0	60.3	55	.23	0	5	2
Month of February	86	72.3	32	48.0	60.2	41	.76	7	12	9

A specimen of *Juniperus chinensis* (F.P.I. 18577) planted in Nursery A-3 in 1917, now about 12 feet tall and having a spread of 10 feet, was transplanted to the farm residence grounds on February 11. A ball of earth 5 feet in diameter by 2 feet thick was moved with the tree. After raising to the ground level by the use of timbers and a lifting jack, it was moved on skids with the 15-30 tractor to its new location. To facilitate handling and cut down on respiration the entire tree was kept wrapped tightly in a double thickness of burlap bagging until March 1.

Twenty-one rotation plots were disked and harrowed. Corn was planted February 25. With two exceptions, all plots were in excellent tilth and seedbed moisture was satisfactory. Two spring-plowed plots on B-6 were too loose and cloddy, as is often the case with spring-plowed land, to afford a good seedbed, and a good rain will probably be necessary to start a satisfactory stand. Due to the prolonged, excessively cold weather of January and cloudy weather of February the soil is noticeably colder than ordinary for this season of the year. Germination will undoubtedly be slower accordingly.

The citrus trees in orchard A-3 which had been wrapped for frost protection were uncovered. All were found to have been frozen to the ground. In addition, field mice had nested in the wrappings and had completely girdled every tree.

During the three-week period the orchards were pruned; screen cages were built to inclose pots planted to cotton for greenhouse study of bacterial leaf spot; orchard D-4 (pistache) was plowed to control Johnson grass; plumbing equipment broken during the January freeze was repaired; and miscellaneous repairs to farm machinery were made.

Station visitors included Dr. D. C. Neal, Senior Pathologist, and L. G. McLean, Scientific Aide, both of the Office of Cotton, Rubber, and Other Tropical Plants, Greenville, Texas, on February 12 to 16 and February 20; George J. Harrison, Associate Agronomist, Office of Egyptian Cotton Breeding, Sacaton, Arizona, February 20; and R. E. McDonald, Principal Administrative Officer in Charge of Plant Quarantine and Control Administration, San Antonio, February 20.

Geo. T. Ratliffe.

Scotts Bluff

The average maximum temperature for the week ending March 8 at this station was 41°, with a maximum of 52 on the 5th and 6th; the average minimum was 13°, with a minimum of 2 below zero on the morning of the 3d. There was a light snow flurry on the 8th.

Weather conditions were excellent during the week, and the annual movement of tenants has been completed. Frost is going out of the ground and general farm work is commencing.

The lamb market, which is of the greatest importance to this section, in a general way is encouraging. The week closed with a 50-cent gain in the price of fat lambs, notwithstanding a rather heavy run. Receipts at the Omaha market for the week were 73,589 as compared with 63,814 for the previous week and 60,496 head for the same period a year ago. Market reports indicate that the lamb feeders have been in better condition this week than at any time this season. The campaign to encourage the consumption of mutton is evidently having some effect.

The livestock at the station are in splendid condition. There has been no loss in any of the lamb lots, but the losses have been rather heavy in some sections of the valley.

The excavation for the basement preparatory to building an addition to the cottage has been completed. Sand and gravel are on the ground, and pouring of concrete will commence shortly.

The driveway into the station is being raised and graded, using the waste from the excavation.

James A. Holden.

Yuma

The maximum temperature for the week ending March 8 was 79 and the minimum 36. The precipitation was .01 inch. Four days of the week were cloudy, two partly cloudy, and one clear. So far the month of March has been much cooler than February.

Most of the plots in the rotations that are to be planted to cotton were watered the first of the week. Planting on these plots started on March 8. The alfalfa on borders B-7 and B-8 was plowed under on February 26. On February 24 the northern and southern thirds of B-7 were treated with 13-48 Ammo-phos at the rate of 250 pounds per acre. Both borders were also watered and planted to Pima 5-3 cotton on March 8.

Some of the early plantings of barley in the rotations have started to head. Young alfalfa in the rotations is growing very nicely. A good stand was obtained in all plots.

The most successful season in the history of citrus growing on the Yuma mesa is now at its peak, according to officials of the Yuma Mesa Grapefruit Company. Twenty-five thousand boxes have already been picked and shipped and about 17,000 still remain on the trees. Because of the exceptionally good weather the sugar content of the fruit is higher than usual.

Arthur T. Bartel.

W E E K L Y R E P O R T S
Of The Office Of
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San Antonio

Although no killing frosts occurred during the three-week period ending March 22, subnormal mean temperatures have prevailed. The aspect of the sky has been predominantly cloudy, there having been only five days recorded as clear. Measurable quantities of precipitation were recorded for seven days of the period. Corn planted February 25 required 14 days to emerge and has made relatively slow growth. Dwarf milo which was planted in the rotation plots March 8 emerged to good stands by the 18th. The last seeding in the time-of-planting flax test was made March 10 and emerged to excellent stands on the 21st. All plantings of flax made since the severe freeze of January are now in excellent condition. The following is a summary of the meteorological data recorded for the three-week period:

Week ending	Temperature						Pre- cipita- tion inches	Aspect of the sky		
	Maximum		Minimum		Mean	G. D. R.		Clear days	Partly cloudy days	Cloudy days
	Abso- lute	Mean	Abso- lute	Mean						
March 8	91	69.0	33	42.3	55.6	38	--	2	4	1
" 15	76	70.1	37	50.3	60.2	32	.54	1	0	6
" 22	79	72.1	41	51.6	61.9	38	.88	2	0	5

A hedge of Agarita (*Berberis trifoliata* Moric.) was planted along the north side of orchard A-1. The plants were collected from a chaparral pasture about one mile south of the station. The Athel (*Tamarix articulata*) hedge along the west side of this orchard was frozen to the ground in January, but every plant is now sending out new growth from the roots.

Palms which were badly frozen back during the severe freeze of January were pruned. All completely dead leaves were removed, which means all leaves on the Washingtonia and Phoenix palms and almost all on several specimens of Inodes. The majority of these trees have shown signs of a renewed growth, but there are two specimens of Inodes exul and several specimens of both Washingtonia filifera and Phoenix dactylifera which appear to have been killed completely.

Seven rotation plots presumably growing winter green manure crops--six of Canada field peas and one of rye--were plowed. The peas had been winterkilled practically 100 per cent, and the growth of rye was not sufficient to cover the ground.

Upon the advice of Captain White, U.S. Army Veterinary Service, Fort Sam Houston, one of our mules, which had been on the sick list since the middle of January and, failing to respond to prescribed medical treatment, had persistently deteriorated, was killed March 24.

Dr. D. J. Worl, Senior Pathologist in the Office of Cotton, Rubber, and Other Tropical Plants, visited the station on March 13 in connection with his cooperative field and greenhouse experiments. Messrs. Jordan, Collins, and Atkins of the Bureau of Chemistry and Soils with headquarters at Austin, Texas, spent March 13 and 14 laying out and placing fertilizers

San Antonio (cont'd)

and soil disinfectants for their cooperative work at the station in the study of the cotton rootrot problem. Rain stopped their work shortly before it was completed. Mr. Dawson, Associate Biochemist in charge of the foregoing office, together with Dr. Collins came to the station March 21 to complete the job, but a shower just prior to their arrival made further postponement necessary.

Geo. T. Ratliffe.

Scotts Bluff

The average maximum temperature for the week ending March 15 was 54, with a maximum of 65 on the 13th; the average minimum was 25, with a minimum of 18 on the morning of the 10th. There was just a trace of rain on the 13th. There has been considerable wind during the week, the average hourly wind movement being about $9\frac{1}{2}$ miles.

The weather conditions have been very good for farm work. The frost is out of the ground and many farmers are disking and plowing. At the station there has been only the usual routine work.

The livestock in the experimental lots are making good gains, and there have been no losses up to this time.

There is little change in the lamb market. During the past week there were $104\frac{1}{2}$ cars shipped from the Scotts Bluff section. The price has held about steady for the week.

The Beet Growers' Association is still working on contracts but so far have not been able to get a sufficient acreage to organize. They have men in the field and are making a united effort to get every grower to sign their contract.

The average maximum temperature for the week ending March 22 was 47, with a maximum of 65 on the 22d; the average minimum temperature was 18, with a minimum of 5 on the morning of the 18th. There were two light snows totaling $1\frac{1}{2}$ inches in depth and with a measured precipitation of .07 inch. There were two days of heavy winds, the average hourly wind velocity for the week being 9.5 miles.

The station has been short of labor during the period, so little was done except to take care of the experimental livestock, which are doing exceptionally well. Both the lambs and calves have made very satisfactory gains and none have died.

The Fourteenth Annual Lamb Feeders' Meeting will be held on April 3. In addition to discussing the feeding of lambs, the wintering and summer feeding of calves will be given considerable attention. This is becoming one of the major feeding activities in this section, and the work of the station along this line is of much interest both to the ranchers and feeders. The program for the day is as follows:

The Feeders' Problems, Prof. H. J. Granlich, Lincoln, Nebraska

Winter Rations for Calves on the Range and Their Effect on Summer

Gains, Superintendent E. M. Brouse, Valentine, Nebraska.

Views of a Practical Lamb Feeder, W. C. F. Smith, Scottsbluff, Nebr.

My Belief as to the Future of Lamb Feeding, Mr. Fred Klink, Omaha, Nebr.

What I Think of Lambs, Mr. C. W. Wright, Scottsbluff, Nebr.

Results from the 15 Lots of Lambs just Closing 120-day Feeding Test.

Superintendent James A. Holden, Mitchell, Nebraska.

Scotts Bluff (cont'd)

The prices for fat lambs continue very disappointing. There was a further decline the past week and the prices are approaching the lowest levels of the season. The top for the week was \$10.20. The usual price was from \$9.00 to \$9.75. Other livestock seem to be following the downward trend of prices and registered a loss for the week.

The price of butterfat is gaining a little, but it is yet too low to show a profit except in the herds of highest production. It is now selling at 34 cents per pound. Eggs are slowly increasing in price, having reached 22 cents per dozen during the week on the local market.

The following tables give the yields of potatoes, oats, and sugar beets on the station for 1929.

Yields of Potatoes in the Irrigated Rotations, Field K, 1929

Rotation No.	Yields per plot in pounds				Bushels per acre
	Total pounds	Through 2" screen Per cent	screen Pounds	Over 2" screen pounds	
4	1,225	26	319	906	81.7
20	2,646	11	291	2,355	176.4
21	4,660	7	326	4,334	310.7
24	2,693	6	160	2,533	179.5
25	4,687	3	141	4,546	312.5
26	1,432	11	157	1,275	95.5
27	4,142	8	342	3,800	276.1
30	3,417	5	171	3,246	227.8
31	5,753	1	58	5,695	383.5
40	4,143	3	125	4,018	276.2
44	4,582	3	138	4,444	305.5
60	4,867	2	97	4,770	324.5
61	5,303	3	159	5,144	353.5
64	4,955	2	100	4,855	330.3
71	4,554	4	182	4,372	303.6
Average	3,937	5	184	3,753	262.5
Continuous plot					81.7
No manure or alfalfa					169.8
Manured plots					320.7
Alfalfa plots					315.6
<u>Field E</u>					
17	5,370	7	375	4,995	358.0
33	5,972	7	420	5,552	398.1
41	6,155	4	245	5,890	409.0
43	6,000	5	300	5,700	400.0
46	4,987	7	350	4,637	332.5
47	5,840	7	410	5,430	389.3
Average	5,717	6	350	5,367	381.1

Scotts Bluff (cont'd)Yields of Oats in the Irrigated Rotations, Field K, 1929

Rotation No.	Straw per plot pounds	Grain per plot pounds	Bushels per acre
1	121	210	26.3
16	183	187	23.4
22	218	232	29.0
23	473	627	78.4
24	296	304	38.0
25	488	592	74.0
27	308	302	37.8
28	270	230	28.8
30	255	247	31.0
31	451	484	60.5
32	140	152	19.0
42	644	736	92.0
44	494	616	77.0
45	583	517	64.6
48	439	581	72.6
60	634	696	87.0
61	765	715	89.4
62	640	700	87.5
64	444	506	63.2
65	570	640	80.0
71	762	768	96.0
Average	437	478	59.8

Field E

13	468	562	70.3
15	559	601	75.1
17	550	640	80.0
19	414	476	59.5
33	475	505	63.1
41	509	581	72.6
43-B	573	467	58.4
43-C	697	803	100.4
46	447	513	64.1
47-B	515	538	67.2
47-C	752	768	96.0
Average	542	586	73.3

Scotts Bluff (cont'd)Yields of Sugar Beets in the Irrigated Rotations, Field K, 1929

Rotation No.	Number of plants per plot	Gross yield, pounds per plot	Tare, per cent	Net yield	
				Pounds per plot	Tons per acre
2	4,200	3,480	4	3,340	6.68
18	2,968	4,805	3	4,660	9.32
20	4,643	5,015	3	4,865	9.73
21	5,200	9,945	3	9,645	19.29
22	2,704	4,910	5	4,665	9.33
23	4,992	10,380	4	9,970	19.94
30	3,676	4,010	3	3,890	7.78
31	4,950	9,350	3	9,070	18.14
32	3,874	4,710	3	4,570	9.14
40	3,380	6,065	4	5,825	11.65
42	3,344	5,905	4	5,670	11.34
45-1	4,586	10,050	4	9,650	19.30
45-2	4,264	7,350	4	7,065	14.13
60	4,534	6,780	4	6,510	13.02
61	5,252	8,950	4	8,590	17.18
62	4,680	5,470	4	5,250	10.50
64	4,212	6,465	4	6,205	12.41
71-1	3,442	6,270	4	6,010	12.02
71-2	5,278	9,385	4	9,010	18.02
Average	4,220	6,185	4	6,550	13.11

Field E

I- 7	5,088	7,915	2	7,755	15.51
8	5,328	8,585	2	8,415	16.83
9	5,376	8,670	5	8,240	16.48
10	5,184	8,755	5	8,320	16.64
11	5,376	8,450	5	8,030	16.06
II- 7	5,280	7,430	2	7,280	14.56
8	5,320	9,485	2	9,295	18.59
9	5,472	10,895	4	10,460	20.92
10	5,664	10,805	4	10,370	20.74
11	5,522	11,940	4	11,465	22.33
13	3,360	7,060	4	6,780	13.56
15	4,992	9,410	7	8,750	17.50
19	4,560	9,420	8	8,825	17.65
33	5,663	12,235	7	11,380	22.76
41	5,760	9,510	7	8,845	17.69
43	4,440	9,575	7	8,905	17.81
46-A	4,848	7,455	4	7,155	14.31
46-C	5,326	8,840	4	8,490	16.98
47	4,800	9,875	7	9,185	18.37
Average	5,124	9,280	5	8,840	17.68

James A. Holden.

Yuma

The most precipitation we have had since September 1929 was on March 15 when .93 inch of rain fell, following a rather severe windstorm.

The maximum temperature for the week ending March 15 was 87, minimum 38, greatest daily range 45, and precipitation .93 inch.

The rain has caused the ground to cool off to a large extent; and unless warm weather comes very soon, much of the recently planted cotton will rot in the ground. Some farmers who planted cotton during the warm weather in the middle of February are having to replant. The damp soil and the cool weather that followed rotted the seeds in the ground.

Station work for the past week included the cutting of hay on Series D, pruning dates, hauling date leaves, and mowing and cleaning the yards.

The maximum temperature for the week ending March 22 was 87, minimum 41, greatest daily range 41, and precipitation .31 inch.

The rainfall of .93 inch on March 15 and .28 inch on March 18 delayed field work for several days, especially the planting of cotton. A few plots in the rotations were planted to cotton on March 21. On March 22 borders A-1, A-2, A-4, A-5, A-6, A-7, A-8, and B-1, and B-2 were planted to the Pima 5-3 strain of cotton. This concludes the cotton planting on series A and B. Several plots still remain to be planted in rotations.

Numerous plant cuttings were set out last week. The cuttings included grapes, pomegranates, oleanders, jasminum, and crape myrtle.

The cotton in the rotations is germinating very well, and it is quite probable that a good stand will be obtained.

Mr. and Mrs. C. S. Scofield were station visitors from March 17 to March 20.

Arthur T. Bartel.

M I S C E L L A N E O U S

A manuscript entitled "Irrigation of Cotton in the Salt River Valley, Arizona" by S. H. Hastings, has been submitted for publication as a Technical Bulletin.

Mr. Beyer Aune, Superintendent of the Belle Fourche Field Station, was in the Washington office from March 14 to March 28 preparing a report on the work of his station and conferring with various officials of the Department.

Mr. I. M. Atkins, Assistant Superintendent of the San Antonio Field Station, left for his official headquarters on March 16 after spending seven weeks in Washington writing reports on certain phases of the work at his station.

W E E K L Y R E P O R T S
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March 29, April 5 and 12, 1930

No. 7

Huntley

Report for period ending March 29

Conditions were favorable for field work during most of the latter half of March. Good progress was made in preparing dry-land plots for seeding and in hauling out a large amount of manure to irrigated fields. Dry weather has prevailed during the past two months and the amount of reserve moisture in dry lands is small. Winter wheat has been damaged to some extent by severe freezing, and high winds have caused soil drifting on fall-plowed and fallow fields.

Included in the 1930 total estimated beet acreage of 25,000 acres for the local factory district there will be somewhat more than 4,000 acres on the Huntley project. The total district acreage is the largest in the history of the local factory. The price is \$7.50 per ton with possible additional payments, depending upon sugar content of beets and selling price of sugar manufactured from the 1930 crop. Approximately 16,000 acres of beets will be treated with acid phosphate, which is now being distributed. It is being applied at the rate of 100 pounds per acre. The product is 45 per cent Treble superphosphate, manufactured by the Anaconda Copper Company.

The price of Great Northern beans remains at \$4.00 to \$4.25 per hundredweight and a few cars have been loaded at this price, although there is still a large amount of beans held on local farms. The low price will no doubt result in decreased acreages of this crop in 1930 and accounts to a large extent for the increase in the acreage of beets.

The price of lambs continues to decline and most of the lambs fed locally have been marketed at a loss of 2 to 4 cents a pound. The number of lambs fed was fortunately comparatively small, so that the total losses are not so great as in some other sections.

Alfalfa hay is selling at \$7.00 to \$8.00 per ton, a drop from \$10 to \$12, the price last November. The price of butterfat has advanced slightly and is now 35 cents per pound.

Dry weather continued during the week ending April 12 and temperatures were much above normal for the season. The maximum temperature recorded was 85, minimum 30, and precipitation .06 inch.

Field work is progressing rapidly and a large part of the beet and grain acreage on the project has been seeded. Preparation is being made to turn water into the canal on April 15 to irrigate pastures and alfalfa. This is nearly a month in advance of the time that irrigation is required ordinarily and unless rain occurs soon it will be necessary to irrigate to provide moisture for seed germination.

At the station the seeding of grains on dry land plots was completed. Wheat and beets were seeded in the irrigated rotations, and the preparation of land for seeding other grains and alfalfa is well under way.

There has been a further decline in the price of beans, and a few sales were made at \$3.80 per hundredweight. Alfalfa is selling at \$7 to \$8 per ton, and there will probably be some old hay carried over through the year.

Dan Hansen.

San Antonio

The following meteorological data were recorded during the three-week period ending April 12:

Item	Week	Month	Week ending		Average 1907-1929
	ending March 29	of March	April 5	April 12	
Temperature:					
Maximum	82.0	91.0	92.0	94.0	---
Mean maximum	61.6	68.3	78.4	89.1	---
Minimum	33.0	33.0	39.0	49.0	---
Mean minimum	38.9	45.5	51.0	58.0	---
Mean	50.2	56.9	64.7	73.6	62.2
Greatest daily range	34.0	38.0	39.0	41.0	---
Precipitation (inches)	.60	2.02	.15	----	1.91
Aspect of the sky:					
Days clear	3	9	3	7	---
" partly cloudy	0	6	2	0	---
" cloudy	4	16	2	0	---

The month of March was characterized by cool, cloudy weather. The mean temperature for the month was 5.3 degrees below the average for March for the past 23 years. Sixteen days during the month were recorded as cloudy. Rainfall for the month was close to normal and occurred for the most part as small showers. A measurable amount of precipitation was recorded on nine days. A frost occurred the night of March 29 when a minimum of 33° F. was recorded. This is not a record for late frost, but is later than usual. The average date of the last frost is March 4. Truck crops, such as beans, peas, and tomatoes, were injured and corn and sorghum leaves were frozen. In general March weather was not favorable for crop growth. Corn and sorghums emerged early in the month but made very slow growth. Small grains were benefited by the moisture received, but they made slow and uneven growth due to the cold weather. The precipitation of March provided good seedbed conditions for sorghums and cotton.

The weather during the first two weeks of April has been favorable for crop growth. The warm, clear weather with the moisture received in March has enabled crops to grow well. All sorghum plantings emerged in a short period and are growing rapidly. Corn has fully recovered from the frost. Small grains are growing fairly well, although a good rain would benefit them greatly. Some rust has appeared in all small grain plantings but very little injury has occurred. Dixie wheat, a soft red winter wheat, and Vaughn barley, C.I.1367, both obtained from the Office of Cereal Crops and Diseases, are fully headed. Flax plantings are all doing well. The first planting in the date-of-seeding test has started to bloom.

During the past two weeks ground has been prepared and the remainder of the sorghum plantings on the station made. A variety test consisting of milo selections has been planted on field C-4. A forage sorghum test was planted on Field B-7. A special test of Hegari, consisting of alternate plots planted in rows and in drills, is located on field A-7. Five plots of row sorghum and seven plots of drilled sorghum were planted as scheduled in the rotations. Sudan grass was planted on two plots. All

San Antonio (cont'd)

these plantings have emerged to good stands. Rotation plot A6-2, which is continuously cropped to milo with an annual application of barnyard manure, became so foul with weeds it was necessary to disk it out and replant.

All fields on which cotton is to be grown have been disked and harrowed previous to planting. Mr. D. R. Hooton of the Cotton Breeding Station, Greenville, Texas, was at the station April 9 to 11, inclusive, supervising the planting of cooperative tests with cotton conducted at this station. A variety test and a spacing test were planted on field D-3. On the Herbst tract a part of the field was planted to Kekchi selections while the remainder of the field was planted to corn. The 30 rotation plots were planted to cotton on April 11. The other plantings will be made as rapidly as possible. In most instances there is sufficient moisture in the ground to germinate the cotton, but there is little reserve moisture.

Corn has been cultivated and thinned and is growing rapidly. Due to favorable growing conditions considerable labor has been necessary to control weeds in the fields, roads, and orchards.

Dr. D. C. Neal was at the station April 9 to 11 in connection with his greenhouse and field experiments being conducted at this station.

I. M. Atkins.

Scotts Bluff

During the two-week period ending April 5 the average maximum temperature was 50°, with a maximum of 72 on the 3d and 5th; the average minimum was 20, with a minimum of 9 on March 27, 28, and 29. The average hourly wind movement for the two weeks was 8.1 miles per hour.

Weather conditions have been very favorable during the entire time. Snow flurries occurred on the 23d, 24th, 25th, and 27th of March, but they did not interfere with farm work. The preparation of beet land has been pushed rapidly, and some beets have been planted. The soil is drying out fast. The precipitation for the first three months has been below normal and rain is needed. Generally over the district, including the dry land area, the fall-seeded grain is in very good condition.

At the station the beet plots are being prepared for seeding. They were all disked and plowing is to start at once. All other plots and fields that are to be spring-plowed have been disked. The hauling of manure has been continued and practically all plots have been covered.

The corn and bean fields in field C were fenced, and the hogs and ewes were turned out to clean up the fields of the wasted grain. These fields also have been disked.

The Fourteenth Annual Lamb Feeders' meeting was held on April 4. The attendance was large and represented all the feeding districts in Nebraska and Colorado. The results of the year's work are shown in the following table.

Lamb-Feeding Experiment, Scotts Bluff Field Station, December 1, 1929, to March 30, 1930
Fed 120 Days. 25 Lambs per Lot

Lot number	1	2	3	4	5	6	7
Daily ration for 25 lambs	Corn-32 lb	Corn-16 lb Pulp-16 lb	Corn-10 lbs Pulp-22 lbs	Corn-4 lbs. Pulp-28 lbs	Barley- 16 lbs. Pulp-16 lbs	Corn-16 lbs Pulp-16 lbs Beet tops	Corn-16 lbs. Pulp-16 lbs. Cake- 6 " Beet tops
Initial weight of lamb .. lbs.	62	62	62	62	62	62	62
Final weight of lamb	97.9	97.4	92.7	90.9	96.5	102.9	110.5
Gain per lamb	35.9	35.4	30.7	28.9	34.5	40.9	48.5
Average daily gain per lamb "	.30	.30	.26	.24	.29	.34	.40
Pounds feed per 100 lbs. gain							
Corn	357	187	129	56	---	162	136
Barley	---	---	---	---	191	---	---
Dry pulp	---	187	302	400	191	162	136
Cottonseed cake	---	---	---	---	---	---	50
Alfalfa hay	657	545	686	820	592	415	348
Beet tons, per ton yield	---	---	---	---	---	2.09	1.79
Cost per lamb at \$12 per cwt. \$	7.44	7.44	7.44	7.44	7.44	7.44	7.44
Feed cost per lamb	3.11	2.65	2.61	2.65	2.44	2.87	3.48
Interest and shipping charge \$	.75	.75	.75	.75	.75	.75	.75
Total cost of lamb	11.30	10.84	10.80	10.84	10.63	11.06	11.67
Appraised value of lamb	9.25	9.25	9.25	9.15	9.15	9.15	9.15
Value of lamb after deducting 6 pounds shrink	8.50	8.45	8.02	7.77	8.23	8.87	9.56
Loss per lamb	2.80	2.39	2.78	3.07	2.35	2.19	2.11
Cost of feed per 100 lbs. gain \$	8.68	7.49	8.51	9.14	7.06	7.03	7.18
Feed costs:	Corn, per ton \$30.00			Barley, per ton \$22.00			
	Dry pulp, per ton 21.00			Cottonseed cake, per ton 50.00			
	Alfalfa hay, " 10.00			Beet tops, per ton yield .40			

Lamb Feeding Experiment, Scotts Bluff Field Station (cont'd)

Lot Number	8*	9	10	11	12	13
Daily ration for 25 lambs	Corn-16 lbs.	Barley-16 lbs.	Pulp-32 lbs.	Pulp-32 lbs.	Pulp-32 lbs.	Pulp-32 lbs.
	Pulp-16 "	lbs.	C.s.cake-8 lbs.	C.s. cake-8 lbs.	C.s. cake-4 lbs.	C.s. cake-2 lbs.
	C.s.cake-6 lbs.	Pulp-16 lbs.	lbs.			
	Beet tops	C.s.cake 6 lbs.	Alfalfa	Alfalfa	Alfalfa	Alfalfa
	Alfalfa	Beet tops Alfalfa				
Initial weight of lamb ... lbs.	42	62	62	62	62	62
Final weight of lamb lbs.	81.4	109.0	103.9	103.4	97.2	92.7
Gain per lamb	39.4	47.0	41.9	41.4	35.2	30.7
Average daily gain per lamb "	.33	.39	.35	.35	.29	.26
Pounds feed per 100 lbs. gain:						
Corn	113	---	---	---	---	---
Barley	---	141	---	---	---	---
Dry pulp	113	141	315	319	375	430
Cottonseed cake	42	51	97	77	46	26
Alfalfa hay	348	320	381	495	594	628
Beet tops. per ton yield	1.63	1.78	---	---	---	---
Cost per lamb at \$12 per cwt. \$	4.19	7.44	7.44	7.44	7.44	7.44
Feed cost per lamb \$	2.49	3.11	3.20	3.21	2.84	2.56
Interest and shipping charge \$	.75	.75	.75	.75	.75	.75
Total cost of lamb \$	7.43	11.30	11.39	11.40	11.03	10.75
Anpraised value of lamb \$	9.00	9.15	9.25	9.25	9.25	9.25
Value of lamb after deducting 6 pound shrink	6.79	9.42	9.06	9.01	8.44	8.02
Loss per lamb .....	.64	1.88	2.33	2.39	2.59	2.73
Cost of feed per 100 lbs. gain \$	6.32	6.62	7.63	7.75	8.06	8.30
Feed costs:						
Corn, per ton	\$30.00	Barley, per ton	\$22.00			
Dry pulp, per ton	21.00	Cottonseed cake, per ton	50.00			
Alfalfa hay, per ton	10.00	Beet tops, per ton yield .....	.40			

*Lot 8 contained 37 lambs but of the same total weight as the other lots.

Scotts Bluff (cont'd)

The average maximum temperature for the week ending April 12 was 76°, with a maximum of 86 on the 9th; the average minimum was 42, with a minimum of 32 on the morning of the 6th. Practically the first precipitation of the year came during this week with a rainfall of .20 inch. The average hourly wind movement for the week was 5.8 miles.

Weather conditions have been very favorable for farm work. Most of the beet ground is prepared and much of the acreage has been planted.

The beet growers' association did not get a sufficient acreage to permit of their organization, so the entire acreage of their members was released for this year. The officers of the association announce that they will go ahead with their plans for another year and endeavor to sign up enough acreage to complete their organization for 1931.

The Pathfinder Irrigation District has moved its offices from Scottsbluff to Mitchell. The District Manager has always maintained his office at Mitchell while the Secretary's office has been at Scottsbluff. This move will probably result in greater efficiency as well as economy since the offices will be housed in the Reclamation headquarters building owned by the district.

The movement of fat lambs to market seemed to have reached its peak last week and prices have recovered slightly, some feeders in the valley getting as high as \$9.75 for light lambs. However, at the end of this week there was a record-breaking shipment of lambs from this district, and the increase may be lost. The station shipped the experimental lambs at the end of the week.

The work at the station during the week has been preparing the fields for the various crops. The fall-plowed beet plots have been disked, harrowed, and floated. The plots in rotations 2, 45, and 62 in field K, and in Series I, Field E have been plowed.

Some experiments were begun this week to test the value of roughage for milk production as compared with the usual ration of roughage supplemented with concentrates. Two groups of cows have been selected from the station herd that are comparable in production, age, and stage of lactation. One group will have only roughage--pasture in the summer supplemented with hay and corn silage when necessary, and through the winter only alfalfa hay, corn silage, and sugar beet tops. The other group will have the same roughage but in addition will receive a grain ration, properly balanced at the rate of one pound of grain to each four pounds of milk.

James A. Holden.

Yuma

The following meteorological data were recorded at this station for the week ending March 29: Maximum 92, minimum 44, and greatest daily range 40. No precipitation was recorded. All the days of the week were clear.

All of the first crop of alfalfa hay on the station has been cut and stacked. The yield was lower than that which is usually obtained in the remaining cuttings.

Eight pigs were obtained the past week and four were put in each of the two hogged-off alfalfa plots in the rotations. The pigs will be

Yuma (cont'd)

removed from rotation 63 the middle of June and the plot plowed and planted to corn. The pigs in rotation 61 will be allowed to remain until the pasture gets very short. This plot will then be plowed and planted to cotton next spring.

All the cotton plots in the rotations have been planted. They seem to have a good stand except two of the late plantings. These will probably have to be replanted.

The maximum temperature for the week ending April 5 was 100, minimum 44, and greatest daily range 52. No precipitation was recorded.

The meteorological data for the month of March are as follows: Mean maximum 79.1, maximum 92; mean minimum 46.3, minimum 35; greatest daily range 45; precipitation 1.25 inches. The twenty-year average precipitation for March is .31 inch. Nineteen days in the month were clear, five were partly cloudy, and seven were cloudy.

Since 1928 all the alfalfa plots in the rotations (except rotations 1, 2, and 3) have received a yearly application of 300 pounds of acid phosphate. This was done to increase the alfalfa yields. During the past week all the second, third, and fourth year alfalfa plots were treated with acid phosphate, and the young alfalfa will receive its application after it has been clipped.

The plot of Bard vetch seed in rotation 28 was cut on April 4. Indications are that a good yield will be obtained from this plot. Cowpeas were planted in rotation 22 on April 5. These will be plowed for green manure late in June and the land planted to grain sorghum.

Dr. T. H. Kearney and Mr. G. J. Harrison, of the Office of Egyptian Cotton Breeding, were station visitors from March 30 to April 1. On April 1 Dr. Kearney and Mr. Noble left for Indio, California, where they attended the Seventh Annual Date Growers' Institute.

The first part of the week ending April 12 was very warm for this time of the year. The maximum temperature was 103, minimum 50, and greatest daily range 44. No precipitation was recorded.

The plot of Bard vetch seed in rotation 28 was threshed on April 9. It yielded 31 bushels per acre, which is considered a very good yield for this variety of vetch.

Slightly over 300 plants of foreign introduced grasses, representing seven different species, were sent here by the Office of Forage Crops and Diseases. These plants were received on April 8 and planted the same day. Attempts will be made to produce viable seed and determine the agricultural possibilities of these grasses for this region.

The cotton in rotations 4 and 31 was replanted on April 9. The first planting resulted in a very poor stand. All the cotton on the station has been cultivated twice, first throwing the soil away from the plants and then throwing it back.

Station work for the past week included the cultivation of cotton, roguing grain plots in the rotations, general hoeing, and cleaning ditches.

Arthur T. Bartel.

M I S C E L L A N E O U S

Dr. W. P. Kelley of the Citrus Experiment Station at Riverside, California, visited the Washington office on April 17 and 18. He was on his way to Europe where he expects to spend the next six or eight months.

W E E K L Y R E P O R T S
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April 19 and 26, 1930

No. 8

Belle Fourche

Under date of April 22 Mr. Beyer Aune reported as follows:

"The month so far has been unusually favorable for all kinds of field work. The fall-plowed ground and land in sugar beets or corn in 1929 was in very good condition as to moisture, and all small grain is coming up with good stands. Crops on land plowed in the spring are not so good and stands are likely to be rather spotted if rain does not occur at an early date.

"All land on both dry and irrigated rotations has been prepared and is ready for planting with the exception of fields I and K, which will be completed this week. All small grain and alfalfa was planted a week ago. There is quite an acreage of flax on the irrigated land this year instead of wheat, and it is hoped that it will give as good or better returns than wheat.

"Some 10,500 acres of sugar beets have been signed up for this year's crop. This is not so large an acreage as last year, but the sugar beet officials say that the beets are going on better land and with better preparation, so the tonnage per acre should be considerably larger than last year. The minimum contract price is \$7.00 per ton.

"Drainage in the Newell territory was started during the month. By the end of the year most of the drainage work will be completed except some small areas in the Arpan district. The drainage work that was completed in the Vale district in 1929 apparently did a lot of good. Land that was all seeped last year is now plowed and put into crop. What kind of a crop this land will produce is not yet known, but it certainly worked up into better condition than the gumbo."

Huntley

Recent rains were of much benefit to spring-seeded crops on both dry and irrigated lands and were sufficient in most cases to insure germination of seeds without the necessity of irrigating. The maximum temperature recorded during the week was 77, minimum 36, and precipitation .65 inch.

The spring has opened unusually early, and unseasonably warm weather has prevailed during April. Native pastures started growth early and range stock are in good condition.

Water was turned into the canals on April 21 and is being used to irrigate alfalfa and pastures. Irrigated pastures will be ready for grazing nearly a month earlier than in 1929. There appears to be an increasing interest in such pastures; apparently a large acreage in the Yellowstone Valley will be seeded this spring, judging from the number of inquiries received at the station.

Seeding of crops on the project is well advanced. A large part of the sugar beet and grain acreage has already been seeded. At the station the seeding of grain was completed and sugar beets in the rotations were seeded.

Mr. R. R. Graves of the Dairy Bureau visited the station on April 25.

Dan Hansen.

San Antonio

Although maximum temperatures have not been excessive during the two-week period ending April 26, the mean temperatures have been above the average. Clear weather has prevailed for the most part, and very little precipitation of agricultural value has fallen. A shower of .39 inch on the afternoon of the 25th will no doubt aid cotton to emerge.

Growth of field crops of corn and sorghums has been rapid during the past two weeks. Cotton has emerged on practically all fields, but the stand is spotted in places due to dry seedbeds. Flax has made satisfactory progress and is in full bloom at this time. Small grains are heading but are suffering considerably from lack of moisture. Small grains throughout the region are "burning" and in need of moisture.

The following meteorological data were recorded during this period:

Week ending	Temperature						Pre- cipita- tion, D. R. inches	Aspect of the sky		
	Maximum		Minimum		Mean	Clear		Partly cloudy	Cloudy	
	Abso- lute	Mean	Abso- lute	Mean						
April 19	88	85.9	53	61.0	73.4	34	0.22	days 5	days 0	days 2
" 26	88	85.9	51	58.6	71.2	34	.39	3	1	3

Milo in the rotations was cultivated twice, and the manured plots A5-6, 12, and 16 were hand weeded. All other sorghum plantings on the station have been cultivated. Corn in the rotations was cultivated and plot B5-2 hand weeded.

Cotton was planted on fields A-3, C-5, C-6, C-7, and F-3 and has emerged to fair stands. A row of cotton was planted on either side of the tree rows in Orchard A-1 in order to determine the areas infected with cotton rootrot.

Fields B-4, D-4, and the pistache orchard on D-4 were disked with the tractor disk to control Johnson grass. Hand labor has been utilized in removing Johnson grass from fields D-4 and F-3 and all rotation fields, and in trimming ends of rotation plots.

The pomegranates in orchard A-3 were trimmed up leaving only one central trunk. A large portion of the plants were killed by the cold weather during the winter. Dead trees in the other orchards were also removed.

I. M. Atkins.

Scotts Bluff

The average maximum temperature for the week ending April 19 was 63, with a maximum of 70 on the 14th; the average minimum was 38, with a minimum of 28 on the night of the 19th. The precipitation for the week amounted to .68 inch and a total for the month of 1.20 inches, as compared with 1.52 inches for the same period last year. The evaporation during the week was 1.211 inches or an average of .173 inch daily. The average hourly wind movement was eight miles.

The experimental lambs from the Station were sold this week and brought \$9 per hundredweight, this being the packer top price. The increased price for the previous week brought in record receipts and the

Station Report (cont'd)

price broke. The peak of the movement has passed and there is not much prospect for any further declines. It is estimated that about 350,000 head of lambs were left in the Colorado and western Nebraska feed-yards at the end of last week. Many of these are being shorn, which will have a tendency to hold back that many for a time and make for more orderly marketing. One hundred and three carloads of live-stock were shipped out of the valley last week, 65 of them being lambs and 38 cattle.

The local prices for other farm produce have not changed greatly. Cream is off a cent in the last week—33 cents for sour and 38 cents for sweet cream. Eggs are holding steady at \$6.00 a case.

For the most part conditions have been good for farm work. The soil has a good supply of moisture, and much of the beet acreage has been planted. Some of the early planting is coming through now. Winter grain in the dry areas is in splendid condition, and the soil is in good shape for the spring seeding. Quite a percentage of the acreage of dry farms that has been normally devoted to spring wheat will be planted to flax this year. The wheat acreage in this section will be materially decreased.

All of the beet plots in Fields K and E at the station have been plowed and prepared for planting. The plots to be used in pasture work this summer have been fenced and other routine work carried on. Water has been turned into the main canal of the Interstate system and it is now running to Lakes Alice and Minatare.

The popularity of barley as a grain crop has been increasing in this section for several years, and there has been a demand for a beardless barley. To meet this demand the Station has been running some variety tests on barley, the results of which are given in the following table. Last year's results gave the Velvet variety a higher yield than the Trebi. These are not the true beardless, but they have soft beards that are not disagreeable to handle in the grain. The results of variety tests of spring wheat and oats are also included.

Variety Tests of Small Grains, 1929

<u>Spring wheat:</u>	Yield* per acre
Marquis	30.8
Kearney	34.3
Chadron	29.3
Kubanka (Durum)	29.8

<u>Barley:</u>	
Glabion	56.1
Minnesota No. 184	66.0
Spartan	59.6
Comfort	65.6
Velvet	75.2
Trebi	70.8

<u>Oats:</u>	
Nebraska No. 21	80.9
Burt C.I. 293	78.3

*Bushels

Scotts Bluff (cont'd)

The average maximum temperature for the week ending April 26 was 64° with a maximum of 72 on the 24th; the average minimum was 41° with a minimum of 40 on the night of the 22d. The precipitation for the period was .30 inch, a total for the month to date of 1.50 inches as compared with 2.44 inches for the same period last year. Evaporation during the week amounted to 1.047 inches, or an average daily evaporation of .15 inch. The average wind movement for the week was 9½ miles an hour.

The week has been cloudy a great part of the time, but farm work has gone ahead rapidly. Probably over 80 per cent of the beet acreage has been planted. Most of the small grain is up. Farmers generally are in splendid shape, so far as being up with their work is concerned. The soil is in good condition; there is plenty of moisture and the outlook for the year is good.

The movement of lambs from the Scotts Bluff section is about over. During the week a number of feeders cleaned up their yards. The season has been a disastrous one for many feeders, and the losses have been heavy. At the best the loss has amounted to the feed bill. The price has not greatly strengthened with the falling off of supplies.

During the week all the beet plots in Fields K and E were planted. The oats and sweet clover plots in Field E, the oats and alfalfa plots in Field K, the grain plots in both K and E, and the oats and sweet clover in III-C were seeded during the week.

Assistance was given Mr. S. R. Nuckols in the second seeding of his time-of-seeding tests.

The irrigation district forces are busy cleaning and strengthening laterals in preparation for the call of water, which will probably begin early in May.

James A. Holden.

Yuma

The maximum temperature for the week ending April 19 was 101, minimum 42, and greatest daily range 53. The precipitation was .02 inch.

The Canadian variety of field peas on border B-4 were cut on April 17. A good yield is not expected because of the poor stand that was obtained when the seed was planted.

The alfalfa on C-32 to 35 was cut for hay. This land was planted to the Indian variety of alfalfa late in 1928, but the stand was poor. Because of this it was pastured by sheep in 1929. Another seeding was made last fall with much better success.

Most of the cotton on the station is well above ground and has a good stand. The first plantings will be ready to thin very soon.

The meteorological data for the week ending April 26 are as follows: Maximum 102, minimum 51, and greatest daily range 49. No precipitation was recorded. The weather was rather warm the first of the week but turned cooler toward the end of the week.

Several hundred sweet potato plants were set out on April 21, and some ^{late} watermelons also were planted on that day.

Yuma (cont'd)

The alfalfa on D-30 to 37 has been cut for hay. This is the second cutting of hay this season. Indications are that good yields will be obtained on all the alfalfa fields on this station.

Cotton thinning started on April 25. So far only border A-3 has been thinned. The cotton does not seem to be very weedy as yet except in a few cases where it was planted after alfalfa.

The maximum discharge of water in the Colorado River at Yuma for the past week was 36,000 second-feet. This was on April 25.

Arthur T. Bartel.

M I S C E L L A N E O U S

Express Charge Slips

A recent decision of the Comptroller General makes it necessary to discontinue the use of Charge Slips in connection with express shipments between points in the field. In the future all such shipments by express must be made on Government bill of lading. All blank charge slips at the field stations should be returned to the Washington office immediately. If an additional supply of Government bills of lading is needed, notify the office at once.

Dr. J. Arthur Harris, who has been a Collaborator in this office for a number of years, died on April 24 at Minneapolis.

A manuscript entitled "Potatoes in Irrigated Rotations at the Huntley Branch Station", by David A. Savage, has been submitted to the Montana Agricultural Experiment Station for publication.

W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII

May 3 and 10, 1930

No. 9

San Antonio

The following meteorological data were recorded during the two-week period ending May 10, including a summary for the month of April.

Week ending	Temperature						Pre- cipita- tion, inches.	Aspect of the sky		
	Maximum		Minimum		Mean	G. D. R.		Clear	Partly cloudy	Cloud
	Abso- lute	Mean	Abso- lute	Mean						
May 3	87	81.0	57	65.0	73.0	23	1.50	days 0	days 2	days 5
May 10	88	83.4	49	64.6	74.0	38	.16	1	2	4
Month of April	92	84.9	45	58.5	71.7	41	2.03	17	4	9

The mean temperature during April was approximately three degrees above normal. The maximum for the month was relatively low, however. Precipitation for the month was only 2.03 inches as compared with 3.25 inches average for the month of April for the period 1907 to 1929, inclusive.

The major portion of the month was clear and field work progressed in good shape. Small grain crops were beginning to suffer from lack of moisture at the time the rains started on April 25. Two small showers previous to these rains were ineffective in providing moisture for crop growth. Crops other than small grains made good growth throughout the month. Cotton was planted early in the month and emerged to fair stands in most plots although a few plots failed to emerge until after the rains.

Numerous heavy rains and some severe storms have occurred in this section of the State during the first part of May.. ~~The rains at~~ the station were mostly in the form of showers, which have been of great value to crops. Rust has appeared in the small grain plantings during this rainy weather, and in the wheat variety test it has damaged some varieties considerably, but the damage to oats in the rotations has been lower than usual. All crops are growing rapidly. Corn and grain sorghum in the rotations are nearing the heading stage. The frequent showers and unsettled weather have also complicated the weed problem on the station.

Bamboo plantings in the nursery were transplanted to the clearing prepared for them along Six-Mile Creek at the south end of the farm. During the past week all cotton plantings, all row sorghums, and all corn on the station have been cultivated. The work of hand weeding all fields is also well under way. Fields B-4, D-4, and that portion of C-4 which is not cropped were disked with the tractor disk. Fallow plots in the rotations were disked. Soil samples were taken on oats plots at time of flowering.

San Antonio (Cont'd)

On April 30 Dr. D. C. Neal and L. G. McLean, Office of Cotton, Rubber, and Other Tropical Plants, Greenville, Texas, arrived at the station for the purpose of completing the field work in connection with their cooperative experiments with rootrot. The north end of Field C-6 was subsoiled to a depth of about 16 inches and copper lime dust applied at the bottom of the subsoiled area by means of a dust gun attachment to the subsoiler.

Dr. E. H. Toole, Associate Physiologist, Seed Purity and Vitality Investigations, Seed Laboratory, and Dr. L. H. Flint, Associate Physiologist, Biophysical Laboratory, U. S. Department of Agriculture, visited the station on May 10.

I. M. Atkins.

Scotts Bluff

The average maximum temperature for the week ending May 3 was 71° with a maximum of 82 on the 2d, the average minimum was 45 with a minimum of 41 on the 30th. The evaporation for the week was 1.133 inches or a daily average of 0.162 inch. The precipitation for this period was 1.48 inches, making a total to date for the season of 2.98 inches. The average hourly wind movement during the week was 8 miles.

The week has been cloudy and wet, and not a great deal of field work has been done. However, all the grain, alfalfa, and sweet clover plots have been seeded, and the grain is coming up nicely. Soil conditions are good, and with the normal amount of rainfall there will be no urgent need for irrigation until well along in May. Alfalfa and sweet clover have made a splendid growth, being from 8 to 12 inches high at this time.

In the western part of the project there have been some very severe hail and wind-storms and heavy precipitation. Especially around Lyman, Fort Laramie unit, there has been unusually heavy rains and hail. All of the storms have seemed to center around that section. As a result the ground is packed and it is doubtful if the seed can get through the crust in some of the heavier soil sections.

All of these rains have been local in character, there having been no general rains, but the entire project has been covered during the last ten days or two weeks.

Practically all of the lambs have been shipped out. Butterfat, which has held rather steady for the last two months, is showing the usual seasonal decline and is now at 51. Whole milk, at the cheese factory, is bringing 46 cents per pound of butterfat. Eggs have dropped to 18 cents per dozen on the local market.

At the station the week has been spent in doing many of the odd jobs that can be handled in wet weather. All of the seed potatoes grown on the farm have been sorted and disposed of. There seems to be a considerable demand for seed potatoes, and the indications are that there will be an increased acreage in the North Platte Valley.

The average maximum temperature for the week ending May 10 was 60° with a maximum of 71 on the 5th; the average minimum temperature was 39 with a minimum of 31 on the morning of the 6th. The evaporation for the week was 0.835 inch or a daily average of 0.119 inch. The week's

Scotts Bluff (cont'd)

precipitation was 1.83 inches, making a total of 4.81 inches for the season. The average hourly wind movement was 8.1 miles during the week.

The week has been cold and wet. Some rain has fallen every day but one. Alfalfa, sweet clover, and grain crops have been making fairly good growth in spite of the cold. Black root is showing up in the beet crop, and the stand of early beets may be rather poor. During the week there have been three frosts, but they did little damage. In the low ground on some portions of the project early potatoes were frosted, but there seems to have been little damage to the beet crop from this source.

Some field work has been done at the station. Plowing in Field A has continued when possible, and the variety tests of wheat, oats, and barley were seeded.

Ten pigs were placed on the pasture plot in Rotation 65, and five ewes and lambs have been placed in each of the pasture plots in Fields K and E. The dairy herd has been on sweet clover pasture during the week.

The movement of lambs to market has just about been completed for the season. According to the records of the Sheep Feeders' Association, 1,667 cars of lambs have been shipped from the valley from January 1 to May 3 as compared with 1100 last year and 1052 cars the year before. The price of late lambs has been better.

James A. Holden.

Yuma

The following meteorological data were recorded for the month of April: Mean maximum 89.7, maximum 103; mean minimum 52.6, minimum 42; mean 71.2; greatest daily range 53; precipitation 0.02 inch. Nineteen days in the month were clear, nine were partly cloudy, and two were clear. The mean temperature for April is higher than any other recorded for that month since 1910.

The week ending May 3 has been very cool and cloudy, with 0.14 inch of precipitation on May 2. The maximum temperature for the period was 86, minimum 49, greatest daily range 37.

The cutting of barley in the rotations was started the past week. Most of the plots that have been cut followed alfalfa, thus making it possible for them to be planted earlier last fall.

Several of the cotton plots in the rotations were thinned during the past week. In the rotation plots the spacing experiments started in 1925 are being continued.

The week ending May 10 was exceptionally cool, the maximum temperatures ranging from 71 to 82 degrees. The minimum temperature was 37, the lowest recorded for May since 1915, and the greatest daily range was 39. No precipitation was recorded.

All the alfalfa in the rotations except rotation 56 was cut, shocked, and stacked during the past week. This included the first cutting of the young alfalfa plots. The second and third years of alfalfa in rotation 56 will be allowed to produce seed.

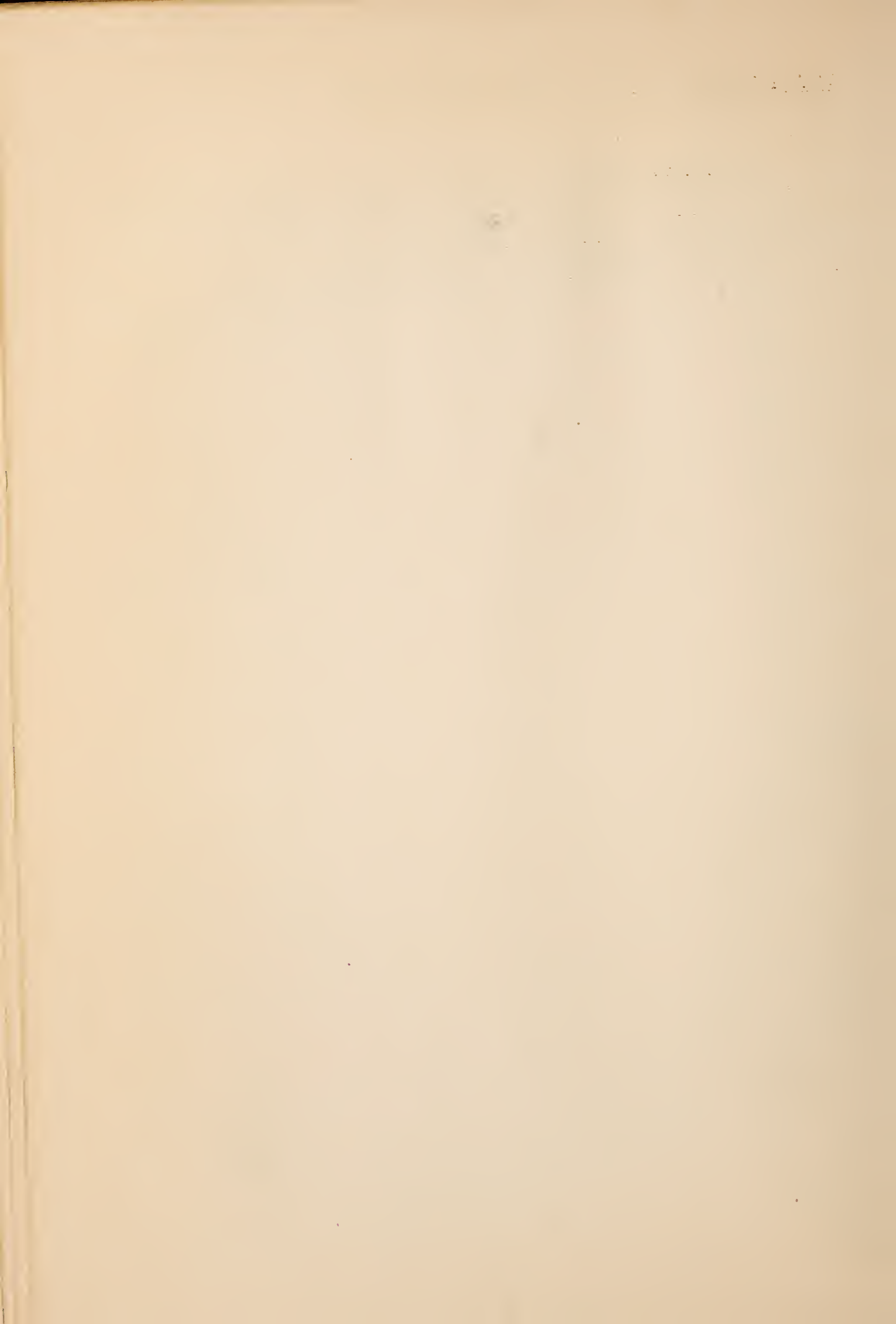
Thinning cotton in the rotations is being continued. Over half of the plots have been thinned. Most of the barley in the rotations was cut and shocked.

Yuma (cont'd)

The maximum discharge of water in the Colorado River at Yuma for the past week was 40,000 acre-feet. This is slightly higher than it was last week. It is probable that the cool weather has delayed somewhat the usual spring rise in the river.

Mr. Roy W. Nixon, of the U. S. Date Garden at Indio, California, visited the station on May 6 and 7 and inspected the dates.

Arthur T. Bartel.



W E E K L Y R E P O R T S
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May 17 and 24, 1930

No. 10

Huntley

Dry weather prevailed during the three weeks ending May 17 and frost occurred on three days during this period. While no serious damage was apparent, the cool weather and lack of moisture has retarded growth of crops. Irrigation water is being used freely for alfalfa, pastures, and grain, and in some cases irrigation is necessary for the germination of late-seeded crops.

The thinning of beets is well advanced and is being done from two to three weeks earlier than in the average season.

Seeding of beans was nearly completed during the week. The total acreage in this crop in Yellowstone County will probably amount to 25,000 acres. The main variety grown is Great Northern, although a considerable acreage of garden beans has been contracted by eastern seed firms.

At the station the seeding of all crops was completed with the exception of beans for which crop the land was prepared for seeding. Other station work consisted of repairing and cleaning irrigation ditches. Irrigated pastures were ready for use by May 1, which is unusually early.

Sheep shearing on the project started on May 15. About 3,000 fleeces have been contracted in the local wool pool. These are from small farm flocks of 10 to 100 sheep to the farm. The price offered locally for wool is from 20 to 22 cents per pound. Several range clips have been sold at 22 cents.

Dan Hansen.

San Antonio

Report for the two-week period ending May 24

During the week ending May 17 the weather continued cloudy with frequent showers, but the past week has been largely clear. During the two-week period the mean temperature has been well above the average for May. Maximum temperatures have not been high, however, and the high mean is attributed to relatively high minimums and to uniformly high temperatures. Precipitation during the period has not been sufficient to meet crop needs. Corn and sorghums especially are in need of moisture and cotton would be greatly benefited. Milo and corn in the rotations are fully headed.

The meteorological data recorded were as follows:

Week ending	Temperature					G. D. R.	Pre- cipita- tion	Aspect of the sky		
	Maximum		Minimum		Mean			Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
May 17	89	85.6	67	71.0	78.3	17	inches .51	days 1	days 1	days 5
" 24	93	87.6	61	66.9	77.2	25	.01	2	4	1

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San Antonio (cont'd)

Practically all small grain plantings have been harvested. Oats for hay were harvested during the first week of the period. Wheat varieties have ripened rather unevenly and several cuttings have been made. Four varieties remain unharvested. Oats in the rotations, variety test, and on fields BC-3 and E-3 were harvested the past week. The quality of oats is better than usual and rust damage was small. Because of the thin stands, however, yields will not be high.

Cotton on the station has all been thinned and the larger part of it has been weeded. Mr. H. C. McNamara, U. S. Cotton Breeding Station, Office of Cotton, Rubber, and Other Tropical Plants, Greenville, Texas, was at the station May 15 and 16 thinning cotton on experiments conducted in cooperation with his office. Stands are good in most cases. Plants are making rather slow growth due to drought. Cotton in the root-rot experiment at the north end of field C-6 under the supervision of Dr. D. C. Neal has failed to germinate and it will be necessary to re-plant.

Orchards have been weeded and are in fair condition, although there is little fruit of any kind. Most of the palms killed during the winter have been removed from the grounds.

Mr. A. C. Dillman, Associate Agronomist in charge of Flax Investigations, Cereal Crops and Diseases, Washington, D. C., was at the station May 19 to 22 taking notes on the flax plantings at the station. Mr. Dillman and Mr. Ratliffe made a trip through the surrounding country studying the adaptability of the land to flax culture.

Messrs. Jordan and Jenkins of the Bureau of Chemistry and Soils, Austin, Texas, made observations of their experiment on rootrot control at this station May 21.

Mr. T. Ralph Robinson, Senior Physiologist in Crop Physiology and Breeding, Office of Horticultural Crops and Diseases, was a visitor at the station May 21 observing citrus, pistache, and date palm orchards in particular.

I. M. Atkins.

Scotts Bluff

The average maximum temperature for the week ending May 17 was 53, with a maximum of 65 on the 14th and 15th; the average minimum was 34, with a minimum of 30° on the night of the 17th. The precipitation for the week was 1.53 inches, making a total of 6.34 inches since April, which is considerably above the average, the normal amount being 3.65 inches for the same period. The evaporation was 0.713 inch or a daily average of 0.102 inch. The wind movement for the week was 8.4 miles per hour.

The weather during the week has been cold and wet like that of the preceding week. While the temperature only dropped below ^{the}freezing point one night, the average minimum for the week was 5 degrees lower than the week before. On the morning of the 17th the rain turned into snow and it snowed practically all day. The temperature that night was not low enough to do any damage to crops or gardens.

During the week the potatoes in the farm cellar were sorted over and all the available seed stock disposed of. There is a strong demand for seed potatoes throughout the valley.



Scotts Bluff (cont'd)

Thinning of beets has commenced on some of the earlier plantings. The stand on many of these fields will be poor.

The beet workers in the Valley are trying to perfect an organization looking toward a somewhat drastic change in their labor contracts. The association has a membership of about 25,000 in the various beet-growing districts. Four changes in the labor contract are asked: Recognition of the association, an increase in pay from \$23 to \$25 an acre, a time limit for completing the beet work, and a provision for an impartial arbitrator in case of dispute over terms of the labor contract.

The average maximum temperature for the week ending May 24 was 69, with a maximum of 87 on the 22d; the average minimum was 41, with a minimum of 30° on the 23d. The precipitation for the week was 0.08 inch, making a total for the season of 6.42 inches. The evaporation was 0.962 inches or a daily average of 0.137 inch. The average wind movement for the week was six miles per hour.

Work on the farm has progressed steadily during the week. We have been short of labor, but none of the crops have suffered from it, and at the end of the week we again have a full crew. All of the beet plots in Fields K and E have been cultivated. During the week the corn plots in Field K and the various silage corn fields were planted. Considerable manure from the feeding pens has been hauled to the fields.

A carload of hogs was sold on the 19th. They averaged 223 pounds and brought \$8.95 at the station.

The numerous frosts and freezes during the last two weeks have done considerable injury to the first crop of alfalfa. Growth has been materially retarded by the frost damage, and in many places farmers have cut the crop in order to get the growth started. Sweet clover seems to have suffered less injury from the cold weather than the alfalfa and it has made a big growth. Other crops are doing fairly well. Unless there is more rain soon, irrigation will commence very shortly. A small head of water is running in many of the laterals now.

James A. Holden.

Yuma

The meteorological data for the week ending May 17 are as follows: Maximum 97, minimum 42, greatest daily range 50. No precipitation was recorded.

All the young alfalfa plots in the rotations were fertilized with 300 pounds of superphosphate per acre. This treatment was also given to the sweet clover plot in rotation 28.

The remainder of the barley plots in the rotations have been cut. Threshing started the latter part of the week. Several of the barley plots were plowed in preparation for the corn and grain sorghums that are to be planted the latter part of June.

Station visitors for the past week were as follows: May 12, Prof. J. P. Conrad, University of California, Davis, Calif.; May 14, Mr. T. Ralph Robinson, Crop Physiology and Breeding Investigations;

Yuma (cont'd)

May 15, Dr. E. H. Toole, Seed Laboratory; and Dr. L. H. Flint, Biophysical Laboratory, Bureau of Plant Industry.

The meteorological data for the week ending May 24 are as follows: Maximum temperature 103, minimum 47, greatest daily range 51; precipitation, none. All the days in the week were clear.

Twelve tons of manure per acre was applied on the barley stubble in rotations 11, 31, and 65. These plots were then plowed and will be planted to grain sorghum the latter part of June.

The remainder of the cotton on the station has been thinned. Some of the earliest planted cotton is forming squares.

The discharge of water in the Colorado River at Yuma was lower the past week than the week before. The maximum discharge for the past week was on May 18 when it was 24,900 second-feet.

All the barley in the rotations on the station has been cut and threshed. A summary of the yields is given in the following table.

Plot Number	Rotation No.	Per cent stand	Yield per plot(lbs.)		Yield per acre (bushels)	Average yield (bushels)	Rank
			Grain	Straw			
<u>1923-1930</u>							
C2- 3	8	75	160	170	13.3	22.4	3
C1- 2	9	75	129	221	10.8	21.1	6
C1- 1	11	85	230	335	19.2	19.3	7
D2- 6	12	90	35	45	2.9	7.6	9
C2- 8	24	70	30	120	2.7	6.8	10
C2- 3	30	70	55	175	4.6	6.0	11
C1-17	42	90	352	378	29.3	22.0	4
C2-16	46	100	379	586	31.6	31.4	1
D2- 1	50	95	345	480	23.8	23.7	2
D2-13	60	95	253	352	21.1	21.5	5
D1-16	63	75	114	126	9.5	14.0	8
<u>New Rotations</u>							
<u>1928-1930</u>							
C2-25	26	70	230	310	19.2	27.6	3
C2-24	28	70	107	113	8.9	26.0	5
C1-27	31	90	210	200	17.5	27.8	2
C1-28	31	80	164	256	13.7	24.3	7
C1-23	32	100	600	635	50.0	50.2	1
C2-20	54	80	174	271	14.5	22.9	8
C1-20	56	100	197	258	16.3	26.1	4
D2-21	65	80	228	277	19.0	25.4	6

Arthur T. Bartel

W E E K L Y R E P O R T S
Of The Office Of
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May 31, 1930

No. 11

Belle Fourche

Under date of June 9 Mr. Aune reported as follows:

"The month of May has been rather cold, and the precipitation was 0.8 inch below normal and 1.5 inches under normal since the first of the year.

"All crops on the project are well along and in good shape except corn, which is rather late for this time of year because of the cold weather. However, good stands of corn were obtained and it has been cultivated once. Small grain will be irrigated this week. Irrigation of alfalfa was started on May 20 and completed one week later. The harvesting of alfalfa will commence on June 16.

"The sugar beets are in very good condition. Thinning was commenced last week and is more than half completed at this time. All the beets have been cultivated once. In the commercial fertilizer test the fertilized beets have made a much better growth than any of the checks. The sugar beets over the project look very good to date. The sugar beet labor problem has been handled better this year than at any time since the factory was started.

"The sheep were sheared on May 20. The average weight of wool was 9.19 pounds per head, which is 1.23 pounds lighter than last year. The wool both this year and last was sold at 24 cents a pound to the Butte County Bank pool.

"The boys' and girls' club camp will begin on June 11. Five counties will participate and an attendance of over 100 is expected."

Huntley

The maximum temperature for the two-week period ending May 31 was 88, minimum 33, and precipitation .19 inch.

Dry, cool weather prevailed during this period and there were several days of high winds. As a result, crops are making slow progress and in many cases are in poor condition due to lack of moisture. Irrigation canals have been run at full capacity, but it has not been possible to keep pace with irrigation requirements.

Frost occurred on three dates during this time and in parts of the valley damaged the more tender crops such as beans and potatoes. Reseeding of beans has been necessary in some fields in the upper part of the valley where stands were lost from injury by frost.

At the station, beans and potatoes were seeded rather late and were not up when these frosts occurred. Land seeded to these crops is being irrigated to provide moisture for germination. Grains and alfalfa are also being irrigated.

On the dry lands the outlook for crops is rather poor and both winter and spring grains are already badly in need of moisture. The situation with regard to rainfall appears to be local and other sections of the State are in much better condition.

Beans, of which there is rather a large carry-over from 1929, are finding a slow market at from \$4.00 to \$4.50 per hundredweight.

Huntley (cont'd)

Butterfat is selling at 28 cents a pound. Sales of wool are reported at 20 to 22 cents a pound. In contrast to conditions a year ago when there was a strong demand for lambs for October delivery, very few contracts have as yet been made for this year's lambs and buyers are offering only from 6 to 8 cents.

Mr. J. M. Stephens of the Office of Dry-Land Agriculture and Mr. J. E. Norton of the Montana Experiment Station visited the station on May 30.

Dan Hansen.

Newlands

The weather this spring has been ideal for growing grain, but too cool to promote a rapid growth of alfalfa. Several places on the project have reported serious damage to crops from cutworms. The usual scattered damage from alfalfa weevil is again reported. Some dusting is being done, but so far no general campaign is under way for this pest control. The cool weather has also encouraged the presence of some aphids, but not to a harmful extent.

Conditions are about normal on the project with the exception of the alfalfa crop, which is a little backward in growth. There appears to be an assured supply of water for this season, which should result in cheaper hay this fall. At the present time there is estimated to be a carry-over of some 7,000 tons from last year. Cheaper hay this fall should help out the dairy situation. The low price of butterfat and costly hay has made this enterprise rather unprofitable during the past winter and spring.

The month of May is generally considered to be the first growing month of the summer. This year the temperatures were below normal and the rainfall exceeded by 1.86 inches the 24-year average.

The following plots have been seeded this spring: Corn on B-18 to 22, inclusive, and D-3, D-6, E-5, F-4; sweet clover, Y-11, 12, 15, 16, 17; wheat, E-4 and Y-18; barley, F-5; sweet clover and rye, C-10 to 13, inclusive; sweet clover and barley, D-1 and D-4; sweet clover and oats, D-2 and D-5; alfalfa and barley, E-1 and E-6; alfalfa and oats, E-2, E-3, and E-7; alfalfa and wheat, F-6.

Three general irrigations have been given this season and there probably will be one more before the first crop of hay is harvested. The rainfall during May substituted for one irrigation.

All abortion reactors and those heifers that are found after a thorough examination extending over a period of several months to be non-breeders are being eliminated from the dairy herd. The milking herd is down to thirteen cows, but these are free from all abortion or breeding troubles. Young heifers are being added to the herd as fast as the State veterinarians pass on their condition. It will probably be some time next spring or summer before the herd has reached the desired number of 30 cows. However, it is hoped that from that time on no trouble will be encountered with non-breeders.

A great deal of work is being done in the general improvement of the station. The farm area is gradually being leveled and many small plots and short ditches eliminated. Improvements have also been made in the farm buildings, fences, etc. The farmstead will present a much better appearance when this work is completed.

E. W. Knight

Scotts Bluff

The average maximum temperature for the week ending May 31 was 71° with a maximum of 86 on the 25th; the average minimum was 47 with a minimum of 44 on the morning of the 30th. The evaporation for the week was 0.902 inch. The rainfall was 0.92 inch, making a total for the season of 7.34 inches as compared with 3.88 inches for the same period last year, and an average of 5.15 inches over a 12-year period.

The week has been cloudy and damp and not good for farm work. Some work was done in fixing fences so that the farm flock of sheep could be run on the ditch banks around the station. Sand and gravel was hauled to raise the driveway leading into the station.

A number of concrete structures have been placed in the distributing laterals on the farm.

The beet plots in Fields K and E were cultivated again after the rains, and the thinning of beets commenced the latter part of the week.

The Superintendent spent several days at the Colorado Agricultural College at Fort Collins during the week.

James A. Holden.

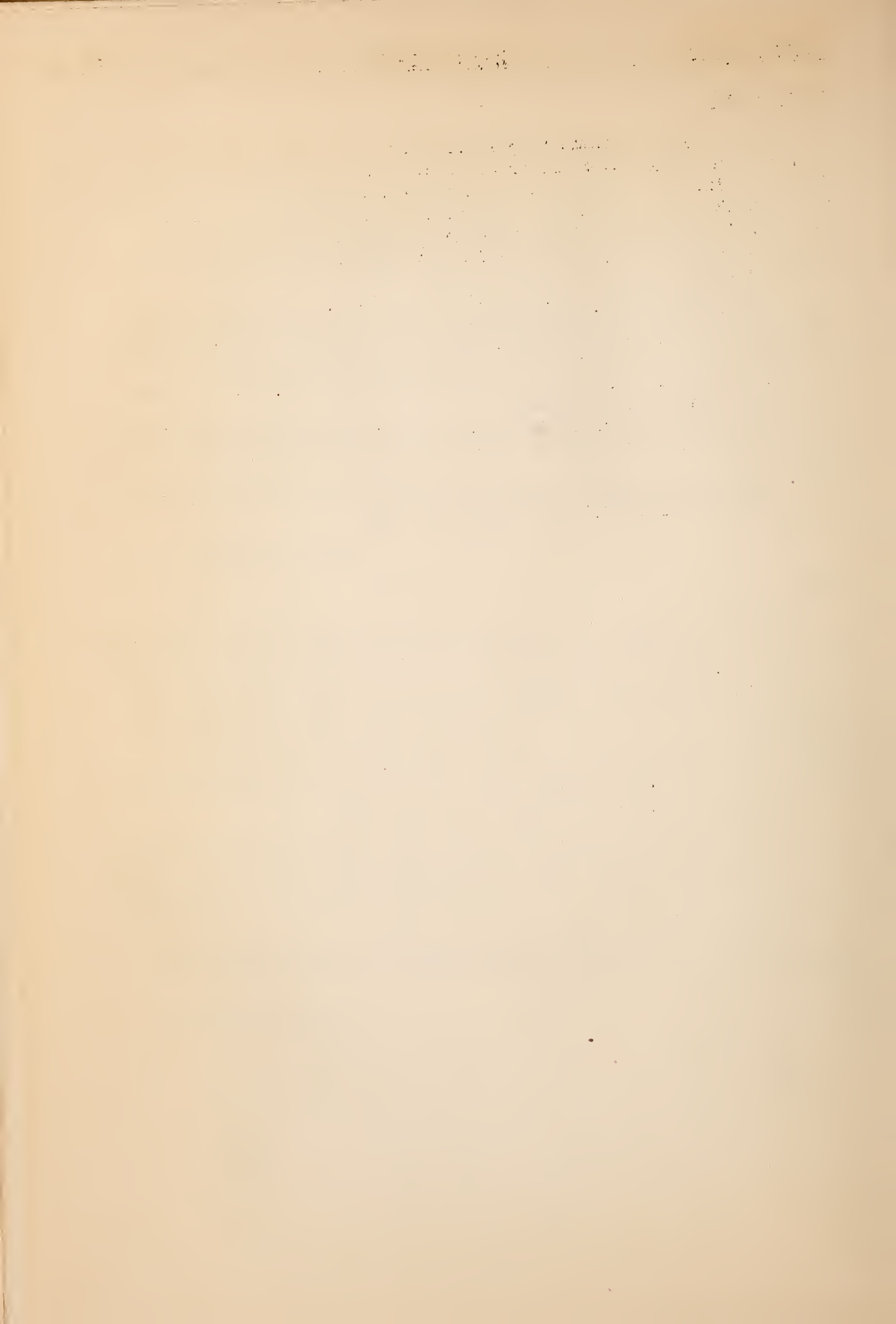
Yuma

The meteorological data for the month of May follow: Mean maximum 88.3, maximum 103; mean minimum 52.2, minimum 37; mean 70.3; greatest daily range 51; precipitation, 0.14 inch. Twenty-three days were clear, seven were partly cloudy, and one was cloudy. The mean temperature of 70.3° is 2.5 below normal and also lower than the mean temperature for April 1930. The minimum temperature of 37 is the lowest recorded for May since 1915. The normal precipitation for May is 0.05 inch. At no other time since 1912 has the precipitation for the month of May been as high as in May 1930.

All the cotton on Series A and B was watered the past week. Just prior to the irrigation 2.5 tons of dry stable manure was applied to A-2, and 190 pounds per acre of 13-48 Ammo-phos. was used as a side dressing on A-3. Several of the drier cotton plots in the rotations were also watered.

Station work for the past week included cultivating cotton, roguing alfalfa seed plots, pruning hedges on station yards, and general hoeing in the rotations.

Arthur T. Bartel.



M I S C E L L A N E O U S

BORON CONDITIONS IN THE CACHE CREEK AREA, CALIFORNIA

By Carl S. Scofield

In the autumn of 1929 Mr. W. R. Schoonover reported to Dr. F.M. Eaton that he had seen evidence of boron injury on citrus and walnuts in the vicinity of Woodland, California. It was learned that the Woodland area is irrigated in part by water diverted from Cache Creek and in part from local wells. Arrangements were made through the cooperation of Mr. W. D. Norton of Woodland and Mr. L. C. Barnard, of Kelseyville, Farm Advisers of Yolo and Lake Counties, to obtain samples of water representing both the surface and underground supplies for boron determinations. Mr. Barnard took two samples on November 29, 1929; No. 2132 from the outlet of Clear Lake into Cache Creek; and No. 2133 from a large spring at Soda Bay at the margin of Clear Lake. The first sample contained 1.76 and the second 12.8 p.p.m. of boron. Mr. Norton collected six samples, of which four were from wells in the vicinity of Woodland, one was irrigation water from Cache Creek near Woodland, and one from a ditch near Rumsey, some miles northwest of Woodland. The four well samples and their boron contents follow: No. 2158, Morris ranch north of Woodland, .33 p.p.m.; No. 2156, Woodland City water, 1.51 p.p.m.; No. 2154, Yolanda ranch, 1.80 p.p.m.; and No. 2153, Elberg ranch, 3.08 p.p.m. The sample from Cache Creek near Woodland, No. 2154, contained 1.58 p.p.m., while that from the Rumsey ditch contained 20.6 p.p.m.

These results indicated that boron occurs in abnormally high concentrations not only in the waters of Clear Lake and Cache Creek, but also in the underground waters in the vicinity of Woodland. In order to obtain additional information as to conditions, the writer visited the Cache Creek area during the first week of May 1930, spending May 5 in the vicinity of Woodland with Mr. Norton, driving around Clear Lake on May 6, and on May 7 going over the area from Winters through Madison to Rumsey. On this trip 21 samples of water were collected.

It was found that the only outstanding evidence of boron injury at that season was in lemons, of which there were occasional trees in a number of the ranch gardens and in the city of Woodland. Orange trees were somewhat more numerous, but with a few exceptions did not show definite symptoms of boron injury. It was too early in the season to find evidences of injury on walnuts or other deciduous fruit trees.

Cache Creek water is utilized to irrigate a narrow, discontinuous strip of valley land from two miles above Rumsey to Capay. At Capay there is a diversion dam which turns the water into a canal through which it is distributed to lands south as far as Winters and east as far as Woodland. This area has an average annual rainfall of approximately 16 inches. Water from Cache Creek has been used for irrigation since 1890 or earlier.

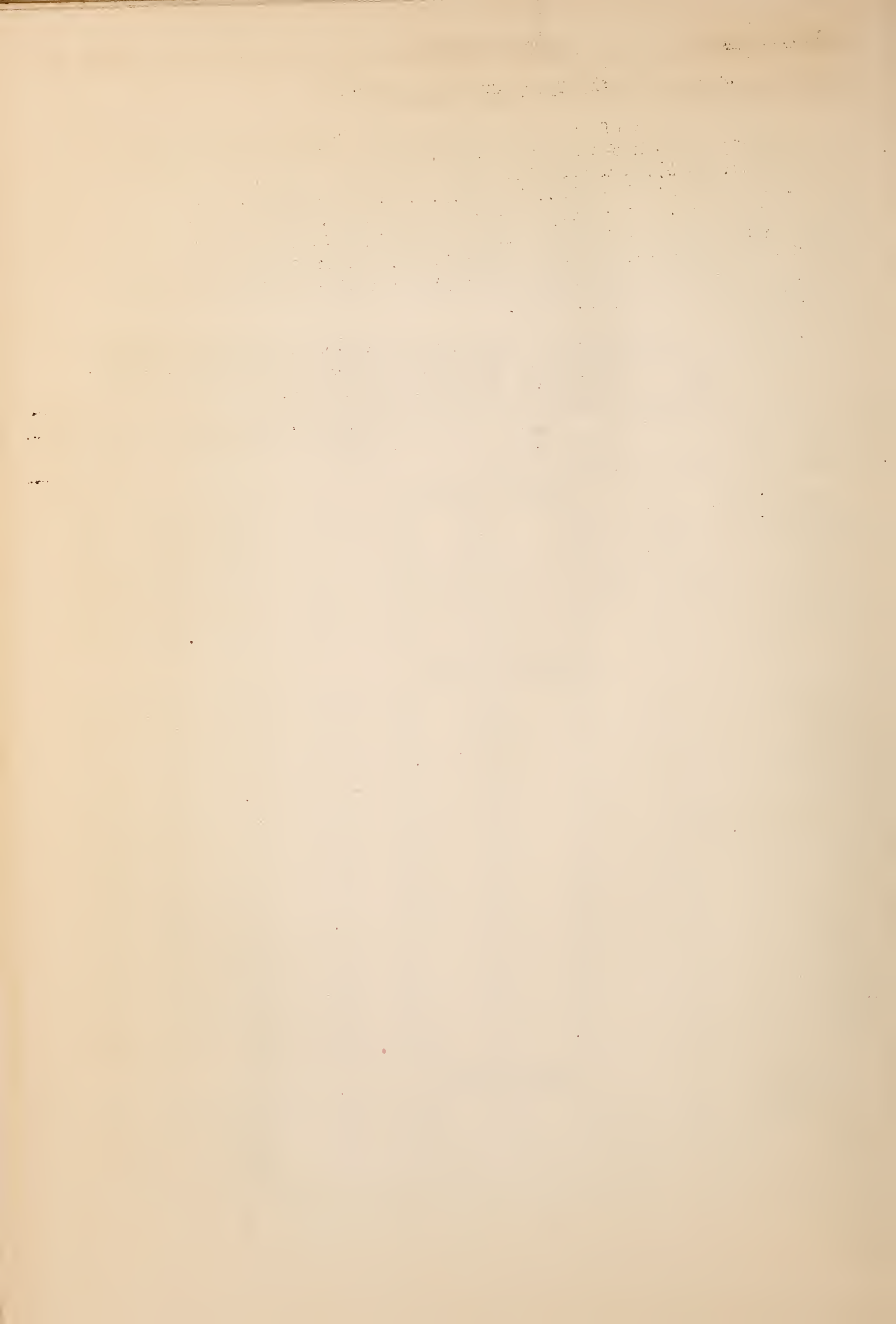
The water supply of Cache Creek is drawn in part from Clear Lake and in part from tributaries joining it below the lake, of which the North Fork and Bear Creek are the most important. The discharge from Clear Lake is regulated. Its average volume for the years 1901 to 1911 was 383,000 acre-feet (Water Supply Paper No. 298).

Boron Conditions in the Cache Creek Area (cont'd)

On the trip of May 6 water samples were taken from Bear Creek (No. 2688), also known as Salt Creek, from the North Fork of Cache Creek (No. 2690), and from Clear Lake (No. 2691). The boron content of these was, for the first 15.8 p.p.m., for the second 1.74 p.p.m., and for the third 1.13 p.p.m. These results show that the boron contamination is general in the drainage basin. In the following table, 15/30, the detailed analytical results are given not only for the water samples collected in May 1930, but also for those collected by Barnard and Norton in the autumn of 1929.

Table 15/30.- The quality of water from the Cache Creek area, California. Collected in November and December 1929 and in May 1930. Analyzed at the Limoneira Laboratory.

Location No.	Lab. No.	Date	K $\times 10^5$ at 25° C.	Boron, p.p.m.	Milligram equivalents					
					CO ₃ -HCO ₃	Cl	SO ₄	Ca	Mg	AE
Surface Waters										
1	2132	Nov. 29	42.0	1.76	3.85	.70	.27	1.81	2.50	.51
2	2691	May 6	32.8	1.13	3.15	.30	tr.	1.42	1.60	.43
3	2690	" 6	42.6	1.74	3.15	.55	tr.	1.48	2.15	.07
4	2688	" 6	358.0	15.80	13.75	20.50	.81	1.50	1.58	31.98
5	2157	Nov. 27	515.0	20.60	13.40	38.90	1.22	3.11	16.03	34.38
6	2154	Dec. 1	60.0	1.58	4.40	1.40	.50	2.21	2.91	1.18
7	2682	May 5	62.6	.44	4.65	1.65	.70	2.11	2.76	2.13
Underground Waters										
8	2158	Dec. 1	73.0	.33	5.20	1.80	.60	2.45	3.94	1.21
9	2679	May 5	77.8	2.03	6.35	1.35	1.05	2.50	3.83	2.42
10	2678	" 5	49.3	1.38	3.85	.95	.73	1.88	2.17	1.48
11	2156	Dec. 5	59.6	1.51	4.10	1.30	.38	2.35	2.87	.56
12	2686	May 5	62.2	1.50	4.55	1.05	.43	2.27	2.79	.97
13	2685	" 5	61.1	1.52	5.15	1.15	.35	2.24	2.79	1.62
14	2153	Nov. 27	108.0	3.08	9.70	1.70	.65	1.61	8.96	1.48
15	2684	May 5	121.0	3.41	10.45	1.95	.71	1.81	8.02	3.28
16	2155	Dec. 5	80.5	1.80	7.00	1.25	.38	2.37	4.72	1.54
17	2633	May 5	81.9	1.69	7.50	1.25	.44	2.30	3.94	2.75
18	2680	" 5	62.1	1.75	4.25	1.55	.70	1.96	2.63	2.01
19	2681	" 5	68.5	1.72	4.55	1.80	.66	2.36	3.08	1.57
20	2698	" 7	87.3	1.61	5.15	2.50	1.17	3.44	3.67	.71
21	2695	" 7	74.1	.66	6.35	.90	.21	3.80	2.13	1.53
22	2687	" 5	79.3	.59	7.00	.90	.95	1.52	5.16	2.17
23	2694	" 7	55.6	.37	5.00	.45	.50	1.94	3.29	.72
24	2697	" 7	56.1	.24	5.10	.45	.41	2.38	2.50	1.07
25	2696	" 7	119.0	2.86	6.45	4.25	1.17	5.04	4.16	2.67
Miscellaneous										
26	2133	Nov. 29	154.0	12.80	15.95	2.10	tr.	10.29	7.54	.22
27	2692	May 6	145.0	11.00	15.75	1.60	.06	5.92	1.51	9.98
28	2693	" 6	513.0	119.00	47.60	11.15	.26	.57	1.47	57.28
29	2689	" 6	3724.0	250.00	122.90	301.50	1.30	.73	tr.	424.97



Boron Conditions in the Cache Creek Area (cont'd)Description of Locations in Table 15/30

1. (2132) Clear Lake water taken at the outlet into Cache Creek, Nov. 29, 1929. The lake level was then below the gate sill.
2. (2691) Clear Lake water taken near Lucerne on the north shore, May 6, 1930. The lake was then at its highest level.
3. (2690) North Fork of Cache Creek at Highway bridge just above the junction of Grizzly Creek, May 6, 1930. Estimated discharge 30 c.f.s.
4. (2688) Bear Creek or Salt Creek near the Highway bridge but below the junction of Wilbur Springs Creek, May 6, 1930. Estimated discharge 8 c.f.s.
5. (2157) Rumsey irrigation canal near Rumsey, California. Standing water after close of irrigation season, probably derived chiefly from Bear Creek which joins Cache Creek just above the Rumsey diversion. Nov. 27, 1929.
6. (2154) Irrigation water from Cache Creek. Sample taken from a ditch west of Woodland, Calif., Dec. 1, 1929.
7. (2682) Irrigation water from Cache Creek. Sample taken from a ditch west of Woodland, Calif., May 5, 1930.
8. (2158) Morris ranch well about 5 miles north of Woodland and east of the road to Knight's Landing, Nov. 27, 1929.
9. (2679) Beal ranch irrigation well 4 miles north of Woodland, about 1 mile north of Cache Creek, May 5, 1930.
10. (2678) Best ranch domestic well, 300 feet deep in NW $\frac{1}{4}$ sec. 13, T 10 N, R 2 E. Two miles north of Woodland near south bank of Cache Creek. Discharge 1 c.f.s. May 5, 1930.
11. (2156) Woodland city water supply from local wells, Dec. 5, 1929.
12. (2686) Woodland city water supply, May 5, 1930.
13. (2685) Court-house well at Woodland, May 5, 1930.
14. (2153) Elberg ranch domestic well, $\frac{1}{2}$ mile south of Woodland, Nov. 27, 1929.
15. (2684) Elberg ranch domestic well, May 5, 1930.
16. (2155) Yolanda ranch domestic well, Sec. 10, T 9 N, R 2 E, about 2 miles southwest of Woodland, Dec. 5, 1929.
17. (2683) Yolanda ranch domestic well, May 5, 1930.
18. (2680) Younger ranch domestic well, 40 ft. deep, 3 miles northwest of Woodland, $\frac{1}{2}$ mile south of Cache Creek, May 5, 1930.
19. (2681) Gile ranch domestic well, 40 ft. deep, $2\frac{1}{2}$ miles west and $1\frac{1}{2}$ miles north of Woodland, $\frac{1}{2}$ mile south of Cache Creek, May 5, 1930.
20. (2698) Peterson ranch domestic well, 36 ft. deep, 5 miles west of Woodland, 1 mile south of Morris Dam on Cache Creek, May 5, 1930.
21. (2695) Domestic well, 80 feet deep, SW $\frac{1}{4}$ Sec. 34, T 9 N, R 1 W, $3\frac{1}{2}$ miles north of Winters, Calif. May 7, 1930.
22. (2687) Davis city water supply, May 5, 1930.
23. (2694) Winters city water supply, May 7, 1930.
24. (2697) Esparto city water supply, May 7, 1930.
25. (2696) Lowrey ranch domestic well, 60 ft. deep, 1 mile west of Rumsey, Calif. and 200 yards from the ditch from which No. 2157 was taken, May 7, 1930.
26. (2133) Spring on the south shore of Clear Lake at Soda Bay, Nov. 29, 1929.

Boron Conditions in the Cache Creek Area (cont'd)

27. (2692) Spring on the south shore of Clear Lake at Soda Bay, partially submerged by lake water, May 6, 1930.
28. (2693) A small lake, about 15 acres in extent, adjacent to but not connected with Clear Lake, at the Buckingham ranch 4 miles east of Soda Bay, May 6, 1930.
29. (2689) Wilbur Spring (bath house supply) on the highway from Williams to Lower Lake, a tributary of Bear Creek, May 6, 1930.

With respect to the analyses reported in Table 15, 50 it will be noted that all but six contained more than one part per million of boron. Nos. 1 and 2 of the table are from Clear Lake. No. 1, taken in the autumn of 1929 when the lake was low, and No. 2 in the spring when the lake was high, appear to differ only in the concentration of salts. Except for the boron the salt content of this water is low. If it be assumed that the average boron content of the lake water is 1.4 p.p.m., and that the average annual discharge into Cache Creek is 383,000 acre-feet, then the annual outflow of boron is equivalent to 6,460 tons of borax. And this is obviously not all the boron contributed to the system. At the time the North Fork was sampled its boron content was 1.74 p.p.m. and its discharge was estimated at 30 c.f.s., and Bear Creek with an estimated discharge of 8 c.f.s. contained 15.8 p.p.m. Taken all together there must be a substantial quantity of borax carried in Cache Creek water every year.

It is believed that the sample from location No. 5 (2157) represents the low-water discharge of Bear Creek. Both in total salt content and in boron this sample is more concentrated than the sample taken from Bear Creek in the spring. Sample No. 2154 is thought to represent chiefly Clear Lake water as it reached the irrigated lands late in the season, while No. 2622 probably represents Clear Lake water somewhat diluted by run-off water resulting from rains in the lower part of the watershed.

Of the underground water samples it will be observed that all of those from the immediate vicinity of Woodland contain more than 1 p.p.m. of boron. No. 2158 from the Morris ranch contains only .33 p.p.m. and may indicate that the limit of boron contamination does not extend very far north of Cache Creek. Yet No. 2679, which is from a well located about one mile north of Cache Creek, has a boron content of 2.03 p.p.m., which indicates that boron contamination is not confined to the south side of that stream.

The samples from location 10 to 20, inclusive, are from wells in Woodland and west of that town. All of these waters are evidently contaminated. The samples from the wells at Davis, Winters, and Esparto indicate that these localities are less seriously affected. The sample from Rumsey, No. 2696, shows the influence of the water diverted by the Rumsey canal.

Of the miscellaneous samples the first two are from a large spring that discharges into Clear Lake at a rocky point on the north side of Soda Bay. The water of this spring is strongly alkaline and contains about 12 p.p.m. of boron. The volume of discharge could not be estimated as the outlet of the spring was submerged by lake water when the sample was taken.

The sample from the small lake at Buckingham ranch is of interest chiefly because of its high boron content. This lake is evidently replenished by submerged springs, and since there is no visible outlet

Boron Conditions in the Cache Creek Area (cont'd)

the present high concentration is probably the result of evaporation. On the margin of this lake there are evidences of old fumaroles, indicating that the boron is of volcanic origin.

The water from Wilbur Springs, No. 2689, is remarkable not only for its high conductance and high boron content, but also for its low content of sulphate. The water of these springs is reputed to have medicinal value. It is hot and gives off a strong odor like that of hydrogen sulphide.

In general the waters of the Cache Creek area show boron contamination and are rather low in sulphates. Also the magnesium content is frequently higher than the calcium, which is not generally the case in irrigation waters.

Washington, D. C.,

June 11, 1930.

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W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII

June 7 and 14, 1930

No. 12

Huntley

For the two-week period ending June 14 the precipitation amounted to .31 inch, the maximum temperature was 94, and the minimum temperature 31. While the temperature indicated freezing on June 5, there was apparently only occasional damage to the more tender crops such as beans and garden truck, and this damage was in no case serious. Several days of high wind along with the continued drouth has made a great demand for irrigation water, and irrigated crops are in only fair condition while crops on non-irrigated land adjacent to the project indicate almost complete failure.

Harvest of the first crop of alfalfa was begun during the week ending June 14. Yields of this crop on the project will be below average.

Sheep shearing on the project was completed and the wool, which will be marketed cooperatively by the Huntley wool pool, was assembled. There was a total of about 35,000 pounds in the pool.

The thinning of beets was completed at the station. Other station work included irrigating, cultivating, and harvesting the first cutting of alfalfa.

Prof. E. C. Chilcott and Mr. J. M. Stephens, of the Office of Dry-Land Agriculture, visited the station on June 14.

Dan Hansen.

San Antonio

Report for the two-week period ending June 7
and summary for the month of May

The month of May was very nearly average in respect to mean temperatures. The maximum of 93 is, however, rather low. Although 16 days were recorded as cloudy and only six entirely clear, the weather was for the most part open and field work was possible most of the time. Precipitation for the month was only 1.11 inch as compared with an average May precipitation of 3.21 inches. This brings the total precipitation for the first five months of 1930 to 7.27 inches as compared with a 23-year average of 11.12 inches, a deficiency of 3.85 inches.

Crop growth during May was in general quite slow. Small grains matured only a fair crop. Quality of grain was good except very light in test weight. Yields were low due to poor stands as a result of winter-killing. Corn and sorghums have headed but are suffering from lack of moisture. The main crop of Milo escaped the sorghum midge, but the insects are so numerous now that all late grain will be destroyed. Hay sorghums have produced only a fair crop and at present are in need of moisture. Cotton has made satisfactory progress throughout the month and squares are forming. Some boll weevil damage has been noted and preparations for dusting are under way.

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San Antonio (cont'd)

The following meteorological data were recorded:

Week ending	Temperature						Pre- cipita- tion, inches	Sky (days)		
	Maximum		Minimum		Mean	G. D. R.		Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
May 31	91	85.9	57	62.6	74.2	28	.20	2	2	3
June 7	94	91.0	64	69.6	80.3	24	---	1	6	0
Month of May	93	85.2	49	66.6	75.9	38	1.11	6	9	16

The first week of June has been quite similar to the two previous weeks in May. No precipitation was recorded. On May 31 the first cotton plant dead from cotton rootrot was observed. On June 4 and 5 stands of cotton were counted and at that time dead plants were found on all four continuously cropped cotton plots and two plants on rotation B6-G.

The late maturing wheat varieties and all flax plantings except two late plantings in the date of seeding test have been harvested. On June 6 threshing of small grains was started. As no rain occurred between harvest and threshing the quality of oats is fairly good. No yields have been calculated.

All cotton plantings have been cultivated and are being hand-weeded. Cotton was replanted in the 48 rows at the north end of field C-6, which is a subsoiling experiment on the control of rootrot conducted by Dr. D. C. Neal. The seedbed was very dry and only a scattered stand was secured.

The plowing of rotation plots scheduled for May has been completed. Fields B-4, C-4, and D-4 were disked for weed control.

Soil samples were taken on corn and milo at the time of flowering, on cotton at the time bolls started to develop, and on oats at the time of harvest.

I. M. Atkins.

Scotts Bluff

The average maximum temperature for the week ending June 7 was 73°, with a maximum of 81 on June 1; the average minimum was 44, with a minimum of 38 on the night of the 5th. The precipitation for the week was 0.34 inch coming in three small showers, making a total for the season of 7.68 inches. The evaporation for the week was 1.101 inches. The average wind movement for the week was 7.9 miles per hour.

The week has marked a splendid growth of all crops. There is still sufficient moisture for most of the crops and comparatively little irrigating has been done except for alfalfa.

Conditions have been very good for the dry land farmers, and winter wheat is in good condition and is beginning to head. In most places there is enough moisture in the soil to mature the crop. There was a considerable acreage of flax seeded on the dry land this spring, which looks quite promising.

At the station the week has been a busy one. The potato plots in Fields K and E were plowed and harrowed. Plowing was finished in

Scotts Bluff (cont'd)

Field D and corn planted in this field. All of the corn fields were harrowed during the week.

There has been a belief among some of the potato growers in this section that the use of sweet clover as a green manure crop is sometimes detrimental in that the resultant decay of vegetable matter causes a degree of heat that is harmful to the germination of the seed. In order to test this idea, three of the plots in Field E where sweet clover is plowed under for potatoes were selected and thermographs will be used to check the soil temperatures. The plots were ditched and prepared for irrigation, and water will be turned on them next week. On one of these plots the sweet clover had made as much as 30 inches of growth.

The raising of the driveway into the station has been continued and gravel has been put on it this week.

The average maximum temperature for the week ending June 14 was 79°, with a maximum of 90 on the 11th; the average minimum was 47, with a minimum of 35 on the night of the 13th. The evaporation for the week was 1.388 inches. The average wind movement for the week was 8.7 miles per hour. There was no rainfall during the week.

During the week the beet plots in Field E were blocked and thinned. All of the corn plots and fields have been cultivated. Water has been run all week. The alfalfa in Field H, the sweet clover pastures in Fields C and E, and all of the bluegrass and native grass pastures have been irrigated.

During the week Mr. H. O. Werner, Associate Horticulturist of the University of Nebraska, was here and planted potatoes in some tests he is conducting to determine the effects of various rotations on seed potatoes. The seed used is taken from the irrigated rotations in Fields K and E.

In the potato plots in Field E, where sweet clover is used as a green manure crop, the thermographs do not indicate any material increase in soil temperature.

On Friday, June 13, there was a very heavy wind the entire day. In the lighter soils some damage was done to crops, especially to the later beets. Grain was burned a little but generally no damage was done to it. The wind was followed that night by a drop in temperature, which brought frosts in some sections, particularly on the Fort Laramie unit. At the station the temperature was 35°.

James A. Holden.

Yuma

Very sudden increases in temperature were noted the past week. The maximum and minimum temperatures for each day in the week are as follows:

		<u>Maximum</u>	<u>Minimum</u>
June	1	93	49
"	2	90	49
"	3	93	53
"	4	99	54
"	5	108	57
"	6	111	57
"	7	112	63

Yuma (cont'd)

All the days in the week were clear. No precipitation was recorded.

The third cutting of hay in the older alfalfa plots in the rotations was completed during the past week. The first year alfalfa was not cut at this time because the plants had not reached the stage where cutting is desirable.

The flow of water in the Colorado River has recently been on the increase. On June 1 the mean discharge of water at Yuma was 29,500 second-feet, while on June 6 the mean discharge was 46,600 second-feet. It is predicted that the maximum discharge of water in the Colorado River will be below normal this year.

High temperatures have continued during most of the past week. The meteorological data for the week ending June 14 are as follows: Maximum temperature 110, minimum 59, greatest daily range 48, precipitation 0.

All the alfalfa hay on B-9 to 16 and C-32 to 35 was cut, shocked, and stacked the past week.

Much time was spent the last part of the week in cleaning ditches. Weeds and accumulations of silt have made it necessary to plow out and clean most of the ditches on the station.

The flow of water in the Colorado River is still on the increase; 53,500 second-feet of water flowed past Yuma on June 9. This is the highest daily discharge of water that has been recorded this season.

Station visitors for the past week were George Harrison, Office of Egyptian Cotton Breeding, Sacaton, Arizona, and T. R. Stanton, in charge of Oat Investigations, Bureau of Plant Industry. Mr. Harrison spent several days here and very carefully rogued all the Pima cotton plantings on this station.

Arthur T. Bartel.

W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII

June 21 and 28, 1930

Belle Fourche

Under date of June 17 Mr. Aune reported as follows:

"The 4-H club camp was held June 11 to 14. The attendance was 100, representing five counties.

"During the past week all the small grain was irrigated, and the corn and beets were cultivated. The thinning of beets is about half completed. All crops are in good condition, but dry land grains are very much in need of rain. The cutting of alfalfa was commenced on the 16th; the crop seems to be about average."

Mr. Aune reported as follows under date of June 27:

"There was over an inch of rain the first part of the week, which was beneficial to the dry land grains and also put the corn and beets under irrigation in excellent condition. The thinning of beets on the project is practically completed. The harvesting of the first cutting of alfalfa is about finished. The irrigation of alfalfa is now under way and will be completed by July 4.

"On June 25 a delegation of farmers from Rapid City spent the day at the farm, going over the various experiments in rather close detail. At noon they had their picnic lunch in the farm grove. Some 60 people were present. On July 11 a similar tour is planned from Faith, South Dakota."

Huntley

Report for the two-week period ending June 28

The first rain of consequence since April occurred during the week ending June 28. This rain came rather late to be of much benefit to dry land crops but did give some relief on irrigated lands where there was a shortage of irrigation water.

On the project, for the most part, irrigated crops are in fairly good condition. Sugar beet thinning was completed by June 20, which is from two to three weeks earlier than usual, and the prospects for this crop are favorable.

A cooperative shipment of 32,000 pounds of wool was made by 50 members of the Huntley Wool Pool on June 23. This wool was consigned to the National Wool Marketing Corporation, which is the wool marketing agency set up by authority of the Federal Farm Board. An advance of 20 cents per pound was received by growers. This represents 90 per cent of the appraised value of the wool.

At the station the harvest of the first cutting of alfalfa was completed on June 21. Other station work consisted of irrigation of alfalfa, grains, and sugar beets and cultivation of all hoed crops.

The maximum temperature during the period covered by this report was 97, minimum 40, and precipitation .94 inch.

Dan Hansen.

San Antonio

During the two-week period ending June 21 rains of great agricultural value have fallen. A total of 2.43 inches was received the week ending June 14. This was followed by two showers the following week totaling 1.05 inches. Only a small amount of run-off occurred.

Following these rains forage sorghum has resumed growth and grain sorghums are nearing maturity. Corn, which had been firing badly, has resumed growth and a good crop is now indicated. Cotton plantings are all making rapid growth. Rootrot is spreading rapidly, and on the continuously cropped plot B5-3 over 15 per cent of the plants have already been killed by the disease. Rootrot has also appeared in plot 2 on field C-5, a plot which has been held fallow since the fall of 1926. Boll weevil are present and have done some damage. All cotton was dusted with calcium arsenate during the past week.

Meteorological data recorded during the period were as follows:

Week ending	Temperature						Pre- cipita- tion	Sky		
	Maximum		Minimum		Mean	G. D. R.		Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
June 14	90	84.3	63	68.9	76.6	25	Inches 2.43	Days 0	Days 2	Days 5
" 21	93	89.1	68	69.7	79.4	24	1.05	3	2	2

Threshing of small grains has been completed. Flax threshing was interrupted by the rains. Yields of small grains are given in the accompanying tables. Moisture samples have been weighed and yields computed on the oats hay plots.

Yields of Oats, Rotation Experiments, 1930

Plot	Rotation	Yield per acre	Test weight per bu.	Rank	Rotation
		bu.	lbs.		
Oats - Grain					
A4-6	A4-C	40.9	19.5	1	Oats, plowed June; fallow
A4-14	A4-F	16.6	21.5	5	Oats, plowed June; milo, field peas, plowed spring; sorghum, drills, plowed Nov.; cotton, plowed fall
A4-18	A4-G	17.9	21.5	4	Oats, plowed June; milo, field peas hay, plowed spring; sorghum, drills, plowed Nov.; cotton, plowed fall
A5-10	A5-C	26.4	21.0	2	Oats, plowed June; cotton, plowed Nov.; milo, plowed July; cotton, plowed fall
A5-14	A5-D	14.2	20.0	8	Oats, cowpeas, plowed fall; cotton, plowed Nov. milo, manure, plowed July; cotton, plowed fall
A5-18	A5-E	14.9	21.0	7	Oats, cowpeas, subsoiled fall; cotton, plowed Nov.; milo, manure, subsoiled July; cotton, plowed fall
A6-15	A6-E	18.8	19.0	3	Oats, manure, subsoiled June; corn, plowed July
B5-8	B5-8	15.8	20.5	6	Oats, continuously, plowed Oct.
Average		20.7	20.5		

San Antonio (cont'd)Yields of Oats, Rotation Experiments, 1930 (cont'd)

Plot	Rotation	Yield per acre Tons	Rank	Rotation
Oats - Hay				
A5- 1	A5-A	1.37	3	Oats, plowed June; cotton, plowed Nov.; milo, plowed July
A5- 4	A5-B	1.18	6	Oats, plowed June; cotton, manure, plowed Nov.; milo, plowed July
A6- 6	A6-1A	1.46	1	Oats, plowed May; milo, plowed July
A6- 7	A6-A	1.38	2	Oats, plowed May; corn, plowed July
A6- 9	A6-B	1.16	7	Oats, plowed Nov.; corn, plowed July
A6-11	A6-C	1.12	8	Oats, subsoiled May; corn, plowed July
B4-18	B4-B	1.19	5	Oats, field peas, plowed spring; cotton, plowed Nov.; milo, plowed July
B5-7	B5-7	1.35	4	Oats, continuously, plowed May

Small Grain Yields, Variety Test, 1930

Variety	C.I.No.	Series I Bushels	Series II Bushels	Series III Bushels	Average Bushels	Test weight Pounds
<u>Wheat</u>						
Kubanka	---	---	---	---	6.1*	50.0*
Ceres	6900	6.3	8.3	5.6	6.7	59.2
Marquillo	6887	7.8	8.2	5.5	7.2	56.0
Hope	8178	8.9	9.2	6.7	8.3	55.0
Reliance	7370	8.8	11.3	5.7	8.6	55.3
Mindum	5296	11.6	8.7	6.8	9.0	60.5
Orlando	--	0.0	0.0	0.0	0.0	--
Kawvale	--	0.0	0.0	0.0	0.0	--
Dixie	--	7.5	4.7	5.1	5.8	59.0
P.1066 x Prelude ..	--	2.0	1.8	1.0	1.6	43.0
Tenmarq	--	5.0	2.1	1.4	2.2	51.5
Oro	--	0.7	1.2	1.2	1.0	46.0
Fulhard	--	0.0	0.0	0.0	0.0	--
<u>Oats</u>						
Texas Red Rustproof	--	19.5	16.9	15.0	17.1	24.7
Ferguson No. 922	--	18.1	16.6	20.2	18.3	25.0
Nortex	--	17.2	18.0	21.9	19.0	25.7
<u>Barley</u>						
Texas Winter	--	10.0	8.2	15.0	11.1	43.5
Vaughn	1367	10.2	10.6	13.1	11.3	41.5
Trobi	--	10.0	9.7	8.2	9.3	42.2
Hannchen	531	0.0	0.0	0.0	0.0	--

*Average of ten check plots.

Seed oats and flax have been recleaned and stored. The March planting in the time-of-planting flax test has been harvested. Ground was prepared and cowpeas planted for green manure on plots A5-14 and 18 in the rotations. Fallow ground on B-4, C-4, and D-4 was double disked for weed control.

San Antonio (cont'd)

Mr. T. R. Stanton, Agronomist in Charge of Oat Investigations, Office of Cereal Crops and Diseases, Washington, D. C., was a station visitor June 10 and 11. Messrs. Jordan and Jenkins, Bureau of Chemistry and Soils, Austin, Texas, were at the station June 9 and 10 in connection with their cooperative work on rootrot control.

I. M. Atkins

Scotts Bluff

The average maximum temperature for the week ending June 21 was 86° with a maximum of 93 on the 17th, 20th, and 21st; the average minimum was 53, with a minimum of 44 on the night of the 18th. The evaporation for the week was 1.422 inches. The precipitation amounted to .35 inch in three small showers, making a total for the season of 8.03 inches. The average hourly wind movement for the week was 6.4 miles.

The weather has been dry and hot. The demand for water became so great that the Pathfinder Irrigation District began the rotation of water the first of the week. Water has been run continuously through the week.

Throughout the valley the crops are in very good condition. The stand of beets is rather poor in places, but throughout the district the stand is about normal.

The potato plots in Fields K and E were planted during the week. Practically all of the potatoes have been planted at this time. The acreage will probably be a little greater this year than last.

The first cutting of alfalfa was harvested during the week. It was just a week earlier than last year, but the yield was not so heavy. The cool weather through May retarded the growth materially. The hay went into the stack in very good condition. The average yield was 1.27 tons per acre.

The average maximum temperature for the week ending June 28 was 90°, with a maximum of 95 on the 27th and 28th; the average minimum was 50, with a minimum of 42 on the night of the 25th. The evaporation for the week was 1.66 inches. The precipitation amounted to .15 for the week, making a total for the season of 8.18 inches as compared with 6.92 inches for the same period last year. The average wind movement during the week was 6.2 miles per hour.

The hot, dry weather has continued, and where moisture has been provided crops have made splendid growth. Notwithstanding the excess of rain this year, it has been necessary to begin the irrigation of small grain earlier than last year. Under irrigation the grain crops give promise of large yields. Barley and winter wheat are beginning to ripen in places where water has been withheld. Beets have made a good growth, but the time is rapidly approaching when irrigation will have to be commenced for in some places they are beginning to wilt rather badly. Early potatoes are looking good and some of the fields are in bloom. Some of the fields have been damaged by the ravages of the bugs, but poisoning was started in time to prevent any serious loss.

Scotts Bluff (cont'd)

In the dry land wheat sections there was generally sufficient moisture in the spring to carry the crop through to maturity, and most of it will be filled out in good shape. The price, however, is the lowest ever known in this section. It has been quoted as low as 47 cents in the west end of the project in Wyoming, while in Nebraska it has been from 55 to 60 cents. Flax is beginning to bloom, and with the normal amount of moisture should make a good crop.

Through an arrangement with the Extension Agronomist of the State Agricultural College, the bean growers of the valley will be given an opportunity to have their fields certified under certain conditions. This will give them an opportunity to grow their own seed and to furnish high grade seed for the market.

At the station the week has been spent in cultivating all beet, potato, and corn plots. Water has been run continuously. Work has also been started on the addition to the Superintendent's cottage, and the sewer system at the station has been rebuilt.

James A. Holden.

Yuma

The meteorological data for the week ending June 21 are as follows: Maximum temperature 106°, minimum 59, greatest daily range 43; precipitation, trace.

The cotton on the station is making rapid growth. Most of the plants are blooming very nicely. The first chopping out of sand-burs and other weeds is now being made.

On June 21 Sesbania (wild hemp) was planted on borders B-3, 4, 18, and 19. This crop seems to do very well here as a summer legume, which is to be used as a green manure.

Station work for the past week included the cultivation of cotton, repairing fences, hoeing cotton, cutting and stacking the first-year alfalfa in the rotations, cleaning ditches, and mowing the lawns.

No marked changes have been observed in the flow of water in the Colorado River for the past week. The maximum discharge at Yuma was 51,000 second-feet on June 20. This is slightly lower than the maximum discharge for the preceding week.

Visitors were as follows: June 18 and 19, Mr. R. E. Blair, former superintendent of this station, and Mr. J. E. Hite, Office of Cotton, Rubber, and other Tropical Plants.

Arthur T. Bartel

M I S C E L L A N E O U S

During the past winter southern Texas experienced unusually low temperatures. As such minimum temperatures have been recorded but once--and then in January 1918--since the San Antonio Field Station was established in 1904, Mr. Ratliffe has made the following report regarding the injury done to certain perennial plantings. The lowest temperature recorded at the station was 9° above zero F.--

S. H. H.

With reference to the hardiness of the various perennial species of plants, both native and introduced, as observed in the vicinity of San Antonio following the unusually severe cold period experienced last January 15 to 24, inclusive, I wish to make the following comments.

The palm species, almost without exception, suffered severely. The various species of Inodes have displayed about equal cold resistance and were the hardiest of the palms planted on the station grounds. They lost from 20 to 50 per cent of their leaves. It is also observed that the flowers of these palms were rendered sterile, as all inflorescences are shedding their flowers soon after emerging. Two Erythea armata palms have shown about the same cold resistance as the Inodes spp.

Of 16 Washingtonia filifera robusta palms on the station grounds, eight were completely killed. The remainder lost all their leaves. It is quite noticeable that the smaller trees of this species are the ones which survived. Observation throughout the city indicates that between 50 and 75 per cent of the trees of this species were killed. There are growing on Alamo Plaza in San Antonio several trees of a species which resembles Washingtonia filifera somewhat, except that the trunk is much more slender and the leaves are decidedly smaller, which withstood the freeze with the loss of only their older leaves. It is my belief they are W. gracilis. These trees are fully 35 feet tall.

All trees of Phoenix dactylifera growing in the station orchard were killed. A few side buds growing near the ground on a few of the smaller specimens have survived. Trees of this species growing on Alamo Plaza suffered a similar fate.

All citrus plantings on the station were either killed completely, killed to the ground, or severely frozen back. Rusk and Savage citranges, which proved to be the most hardy, showed wide variability between individuals. Some of the older seedlings of these two varieties were killed back as much as 75 per cent, while a couple of specimens of each were only defoliated with the younger growth killed. Two Rustic citranges had about 80 per cent of their wood killed, while one Cunningham tree was killed to the ground. A couple of trees of Rusk citrange on sour orange were killed down to the union, new sprouts now appearing from the stock. All Meyer lemon trees and younger budded material had been wrapped in sorghum stalks and burlap, then banked about 18 inches high with soil. The Meyer lemons on their own roots were frozen down to within 3 to 10 inches of the ground, but are now making good recovery. The oranges and grapefruit budded on citrange stock were frozen to within an inch or two of the union. Most of them have succeeded in putting out new buds and are growing slowly. A few were completely killed. Rough lemons and Sour oranges, growing from

Miscellaneous (cont'd)

stocks which originally had been budded to other sorts, were in all cases frozen to the ground; all are throwing sprouts from their crowns.

Two large olive trees of the varieties Chemlali (F.P.I. 13567) and Grosse aberkan (F.P.I. 13257), respectively, set in position in 1907, were killed to the ground. All pomegranate bushes were killed to the ground, but have made rank sprout growth from the crown.

Of the broad-leaf evergreens such sorts as ligustrum, euonymus, pittosporum, kumquat, and laurel lost portions of their foliage, and in rare cases some of their more succulent wood; but only a few plants which were evidently previously weakened from some other cause had a considerable percentage of their older wood killed. Oleanders were, without exception, killed to the ground but every plant observed is making rapid recovery. Those plants of Athel (Tamarix articulata) set at the west side of our orchard A-3 April 12, 1929, which had not died of cotton rootrot, were killed to the ground but are now making very good growth.

The native evergreen, pistache (Pistacia texana) were practically denuded of foliage, but no damage appears to have been done the wood. Another native evergreen, the Huisache (Acacia farnesiana (L.) Willd.), whose northern limit is not much above San Antonio, suffered severely. Many large trees were killed to the ground, some were completely killed, while the majority suffered the loss of many branches scattered miscellaneously through the tree.

For the most part the deciduous plants were not injured. Crape myrtle was an exception in that these plants lost about the outer half of their wood. The one fig tree which has survived at the station, a Green Ischia growing at the north side of our barn, survived with the loss of only a very few branches. Two of the mulberry trees (Morus rubra) at the west side of the farmstead were unable to withstand the low temperatures. One was entirely killed, and the other lost several branches. It was at first assumed that the weakness of these trees was the effect of an attack of cotton rootrot, but when the dead one was removed no signs of this disease nor of any other contributing cause could be detected.

This account of the damage done to perennial plants in this area by the freeze of last January is recognized as being rather incomplete. No attempt has been made to list those species which appeared completely hardy, and probably some which are important and were damaged have been overlooked. It is believed, however, that the more important species which did not withstand the winter without damage have been included.

Geo. T. Ratliffe.

San Antonio, Texas,
June 14, 1930.

W E E K L Y R E P O R T S
Of the Office of
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July 5 and 12, 1930

No. 14

Huntley

Report for the two-week period ending July 12.

A rainfall of .88 inch, which was the first rain of consequence since early in June, was of much benefit to crops and afforded relief from the high demand for irrigation. This rain followed a 10-day period of excessively high temperatures. Crops generally are in good condition and beets and beans are well advanced for this season. The alfalfa crop is perhaps not as good as usual but should command fairly high prices due to feed shortage in adjacent non-irrigated lands.

Station work included irrigating, weeding, and last cultivation of row crops.

The maximum temperature recorded during this period was 105, minimum 59, and precipitation .88 inch.

Dan Hansen

Newlands

Report for the two-week period ending July 12.

The first crop of hay has been cut and stacked. The yields this year are 31 per cent larger than last year from those plots that were in alfalfa during both years. The increased production has been quite noticeable each year. The farmed area of this station is improving, showing that our methods of reclamation are bringing results.

The general farm work has consisted of cultivating corn and orchard, irrigating the various cropped areas, repairing buildings, and miscellaneous work about the farm grounds.

Mr. Moon is continuing with the boron survey and other laboratory and field work. The method developed here for applying gypsum to irrigation water is being given further trials this year. Those plots receiving this treatment seem to be benefited.

The State dairy herd is reaching the stage where the veterinarians are hopeful that we have a herd about free of breeding troubles. It will probably be eight or nine months before further planned experiments with the dairy cows will be started.

The comparative weather report for the month of June follows:

	1930	Avg. 24 yrs.
Temperature, mean maximum	85.7	83.7
mean minimum	45.7	47.1
mean	65.7	65.4
highest	98	96.7
lowest	38	35.7
Precipitation, inches	00	.33
Wind, miles per hour	2.86	3.61
Evaporation, inches	7.83	9.04
Days, clear	29	22.2
partly cloudy	1	4.1
cloudy	0	3.7

E. W. Knight

San Antonio

Report for the two-week period ending July 5,
and summary for June.

Although crops suffered some from lack of moisture the first week in June, the month was in general quite favorable for the growth of crops. Maximum temperatures were not so high as they often are at this time of year. The mean temperature for the month was 1.6 degrees below the 23-year average. Precipitation was 3.48 inches, or .7 inch above the average. Practically all of this rain was received in a five-day rainy period.

Grain sorghums matured a fair crop although they were damaged considerably by midges and birds. Forage sorghums are approaching maturity and will produce a fair crop. Corn was greatly benefited by the rains in June and will produce a good crop. Cotton has made satisfactory growth and an exceptionally large number of flowers, squares and bolls are being produced. Boll weevil have done some damage in this section but not very much so far. Poisoning with calcium arsenate was resorted to on the Station. Rootrot of cotton made its appearance rather early in the season and has been very destructive on the continuously cropped plots.

During the first week of July the weather continued clear and hot. Crops are again beginning to need rain. A second crop of forage sorghum will not be able to start growth until rains occur.

Meteorological data recorded for the period were as follows:

Week ending	Temperature						Pre- cipita- tion	Aspect of Sky(days)		
	Maximum		Minimum		Mean	G. D. R.		Clear	Partly Cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
June 28	99	95.9	67	70.9	83.4	31	Inches	Days	Days	Days
July 5	97	96.0	70	72.4	84.2	26	- -	5	2	0
Month	97	96.0	70	72.4	84.2	26	.02	3	4	0
of June	99	90.5	63	70.0	80.3	31	3.48	9	14	7

During the past two-week period the remainder of the flax was threshed. Yields have been computed and are given in the following table.

Yields of Flax, Variety Test, 1930

Variety	C.I.No.	Series I	Series II	Series III	Average	Test Weight
		Bushels	Bushels	Bushels	Bushels	Pounds
North Dakota						
Resistant.....	13	---	---	---	8.2*	50.0
Linota.....	244	9.0	9.4	---	9.2	56.3
Bison.....	---	7.9	7.4	7.5	7.6	52.7
Long 79 (Rio).....	280	8.6	8.1	8.2	8.3	53.5
Rosquin.....	109	10.2	9.5	7.9	9.2	55.3
Morteros.....	107	6.9	5.7	7.9	6.8	53.2

* Average of 6 check plots.

San Antonio (cont'd)Time of Planting Flax Test, 1930

Date Seeded	Yield		Test Wt.	
	N.D.R.114	Rosquin	N.D.R.114	Rosquin
	Bushels	Bushels	Pounds	Pounds
January 16..	7.9	---	49*	---
January 24..	---	10.6	--	55
February 5..	7.4	9.2	46*	53
March 10....	4.9	2.4	53	52

* Damaged by rain while in the shock.

Milo in the rotations was harvested and all shocks capped. The variety test of sorghums and the special method of planting test of Hegari were harvested. A late planting of sorghum, including all varieties used in the variety test, was made on field C4. All cotton on the station was cultivated. Cotton was given the second and third dustings for boll weevil control. All fallow ground was disked and weeded. Plots on field C5 scheduled for July plowing were plowed.

Soil samples were taken on milo and sorghum plots at maturity.

Dr. P. C. Mangelsdorf, Agronomist, Texas A. and M. College, and Mr. Henry Dunlavy, Superintendent, Texas Agricultural Substation No. 5, Temple, Texas, were station visitors June 26.

Dr. D. C. Neal, and L. G. McLean, Office of Cotton, Rubber & Other Tropical Plants, were at the station June 26 to 29 in connection with their work on cotton rootrot.

I. M. Atkins

Scotts Bluff

The average maximum temperature for the week ending July 5 was 91°, with a maximum of 100 on July 2; the average minimum was 55, with a minimum of 46 on the night of the 29th. The evaporation for the week was 1.973 inches. The average hourly wind movement for the week was 6.1 miles. There was no rainfall.

The week has been extremely hot and dry. All crops that have been irrigated are making good growth. The demand for water for irrigation is so great that it is becoming difficult to cover all crops thoroughly and adequately.

Grain crops are ripening fast, especially in the dry land sections, and good yields seem to be promised. So far no destructive hailstorms have been reported in the valley.

At the Station the work for the period has been the irrigation of grain plots in Fields K and E and the other grain fields and pastures. Sand and gravel has been hauled for the concrete work on the building under construction.

The fall pigs that have been on the alfalfa pasture in Rotation 65 for a 60-day period were taken off this plot and put with the spring pigs on self-feeder and on alfalfa pasture in Field A. There was an average of 7 pigs in this test, and the average initial weight of the pigs was 79 pounds. The average final weight was 129.4 pounds, making

Scotts Bluff (cont'd)

a total gain per pig of 50.4 pounds or an average daily gain per pig of 0.84 pound. The fall pigs were replaced with 10 medium size spring pigs averaging 81 pounds each.

The average maximum temperature for the week ending July 12 was 96°; with a maximum of 102 on July 7. The average minimum was 61, with a minimum of 56 on the night of July 7. One light shower occurred during the week--0.13 inch--making a total for the growing season of 8.31 inches. The total evaporation for the week was 1.798 inches or a daily average of 0.257 inch. The average hourly wind movement for the period was 6.2 miles.

The following table gives the total precipitation for each month of the growing season this year in comparison with last year and a 12 year average:

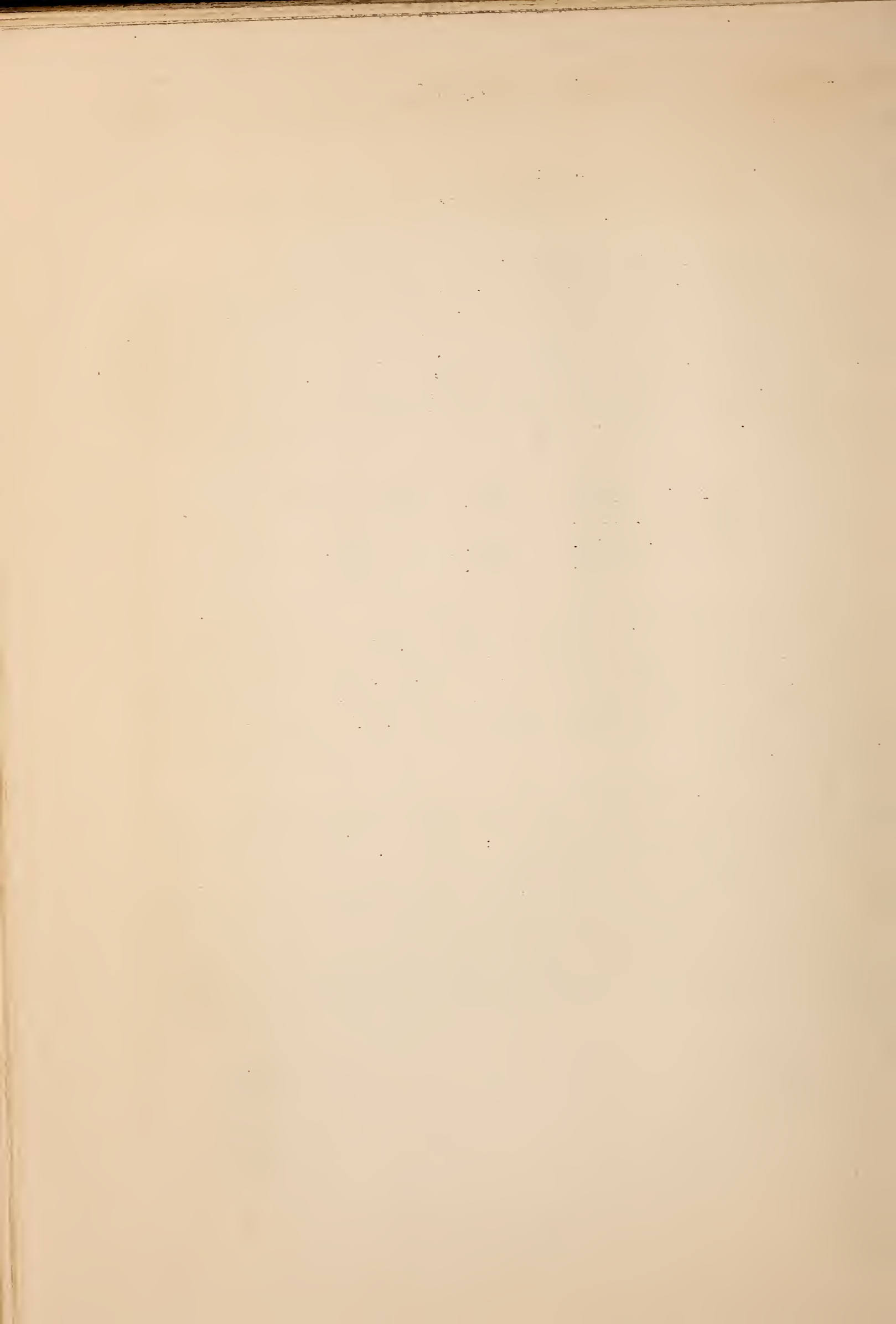
	<u>1930</u>	<u>1929</u>	<u>12-year average</u>
April.....	2.78	2.44	2.05
May.....	3.87	1.64	3.10
June.....	<u>1.53</u>	<u>5.04</u>	<u>2.10</u>
	8.18	7.12	7.25

While this shows that the total precipitation has been above the average, the crops have not been able to use the moisture, due to the fact that the rains have been frequent, but light, throughout the season. During the three months, 30 periods of precipitation have occurred, 20 of them measuring less than 0.25 inch. Not more than one inch was recorded after any one rain during this period. As a result the moisture in most cases was taken up by evaporation and winds before the plants received any benefit.

In most sections crops are making splendid growth and are in good shape. Grain is ripening fast. Water has been run continuously at the Station and the beet plots have all been irrigated. Work is being pushed on the addition of the Superintendent's cottage.

Attached hereto is a table showing the results of the dairy herd operations at the Station for 1929. Taking the average cost of producing butterfat last year and applying it to the operations for this year, it will be seen that the dairymen are just about getting the cost of feed back. Butterfat in sour cream is bringing 25¢ per pound and whole milk at the cheese factory is bringing 32¢ per pound of butterfat. The feed cost of producing butterfat in the Station herd last year was 24.6¢ per pound.

James A. Holden



SUMMARY OF PRODUCTION DAIRY HERD SCOTTS BLUFF SUBSTATION -- 1929

No. Cow	Nos. in Milk	P r o d u c t i o n			Value of Production	C o s t o f f e e d			Value of Product above Feed cost	Unit Cost Feed	
		Pounds Milk	Test	Pounds Butterfat		Roughage	Grains	Total		100# Milk	Pounds B. Fat
103	12	18,832	3.8	709.8	\$375.14	\$41.34	\$93.40	\$134.74	\$240.40	\$0.72	\$0.190
108	12	19,484	3.2	629.6	322.99	41.65	98.86	140.51	182.48	.72	.223
109	10	14,514	3.7	536.7	286.39	40.85	85.74	126.60	159.79	.87	.238
111	12	13,331	3.2	423.1	218.53	40.10	74.10	114.20	104.33	.86	.270
112	11	10,585	4.0	421.4	216.83	40.64	65.46	106.10	110.73	1.01	.252
117	10	12,112	3.6	431.5	234.94	38.59	64.21	102.80	132.14	.35	.238
118	11	13,510	3.4	458.3	247.50	41.12	74.35	115.47	132.03	.85	.252
121	12	10,592	3.4	360.1	194.72	41.02	64.15	105.17	89.55	1.00	.295
8	9	11,841	3.6	421.2	217.53	39.48	70.90	110.38	107.15	.93	.262
9	8	9,355	3.6	332.9	174.34	40.00	54.20	94.20	80.14	1.01	.283
12	9	9,332	3.6	329.4	170.67	38.16	57.20	95.36	75.31	1.02	.290
Total		143,488		5,054.0	2,659.58	442.96	802.57	1,245.53	1,414.05		
Ave.	10 1/2	13,044	3.5	459.4	241.78	40.27	72.96	113.23	128.55	.87	.246

Note: Numbers below 100 indicate grades; 100 and above are purebred Holsteins.

17. 12. 1917

18. 12. 1917

19. 12. 1917

20. 12. 1917

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W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII

July 19, 26, and August 2, 1930

No. 15

Huntley

Favorable weather conditions prevailed during the week ending July 19 and crops as a rule are making good growth. The outlook for beets and beans is particularly good at this time. The rains of the previous week and the lower temperatures have somewhat relieved the situation with regard to the irrigation water supply. With the irrigation of grain crops completed it is not probable that there will be a serious shortage of water for other crops during the remainder of the season.

The early and continued use of the maximum amount of irrigation water during the season has apparently brought about an unusual rise in ground-water levels, and there is evidence on some parts of the project that the water table is becoming dangerously high. While the damage to crops is not yet extensive, it is apparent that additional drainage facilities will soon have to be provided.

The harvest of the second crop of alfalfa was begun during the week. Other station work included irrigating and weeding.

Dr. W. A. Taylor, Chief of the Bureau of Plant Industry, visited the station on July 15.

The maximum temperature recorded during the week was 97, minimum 50, and precipitation .17 inch.

Dan Hansen.

San Antonio

Clear, hot weather has prevailed throughout most of the two-week period ending July 19. The 2.66-inch rain received July 9 and 10 was of great value to cotton and corn and started growth of a second crop of sorghum. Corn is now nearing maturity. Cotton is well set with early bolls which give indications of a good crop. Boll worms are present and are doing some damage. Plant lice, which became quite numerous following the applications of calcium arsenate dust, are now being successfully controlled by parasites. Considerable natural shedding of cotton squares is now taking place, and boll weevils are causing a small amount of shedding. Cotton rootrot has spread rapidly on all continuously cropped plots in the rotation experiments, although the spread in rotated plots has been relatively slower. The loss from the disease on most plots on Field C-5 is high, and the losses in the rootrot control experiments on Fields A-3 and C-6 are also high.

Meteorological data recorded for the period were as follows:

Week ending	Temperature					G. D. R.	Pre- cipita- tion, inches	Aspect of the sky (day		
	Maximum		Minimum		Mean			Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
July 12	96	91.9	67	70.1	81.0	29	2.66	3	3	1
" 19	97	96.0	69	71.9	83.9	28	--	3	4	0



San Antonio (cont'd)

The forage sorghum plots in the rotation experiments have been harvested. The yield of hay is about average and the quality is good. Field BC-3 and pasture D-5 were plowed with the tractor plow. All cotton on the station was cultivated following the rains of July 9 and 10. All alleys between plots on rotation fields and C-5 were disked for weed control. Fields B-4 and D-4 were disked for weed control. Hand labor has been utilized in weeding fields, orchards, and nurseries.

Brush was grubbed and cut from the fence row at the south end of the farm. A portion of the waste area south of the rotation experiments will be cleared of brush, plowed, and planted to alfalfa this fall.

Messrs. Jordan and Jenkins, Bureau of Chemistry and Soils, Austin, Texas, were at the station July 11 and 12 taking notes on their experiments.

Report for the two-week period ending August 2

The weather during July has been dry and hot. A rain of 2.54 inches received on July 9 was valuable in sustaining cotton growth and helping to mature corn. The dry weather which followed rapidly reduced the soil moisture, and all crops have been suffering from lack of moisture for two weeks. A precipitation of .41 inch was recorded at the U. S. Weather Bureau office in San Antonio on August 1, but only .07 inch was received at the station. The rainfall for July was 1.06 inches above the 23-year average for July. In spite of this fact all crops have suffered from the drought. Forage sorghums have made only a small amount of growth since the first cutting was removed. Sudan grass is badly burned. Maturity of corn was hastened by the dry weather. Prospects for a high yield of cotton have been so reduced that it now appears there will be less than an average yield. This deterioration has been brought about by dry weather shedding, boll weevil, and boll worm. This is the first time the boll worm has been a major pest in cotton at the station. The mean temperature for the month was slightly below average. Evaporation from a free-water surface was 8.795 inches, which is very close to the average for the month of July.

The meteorological data recorded for the period are as follows:

Week ending	Temperature						Pre- cipit- ation	Aspect of the sky		
	Maximum		Minimum		Mean	G. D. R.		Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
July 26	98	96.6	64	70.4	83.5	33	inches	days	days	days
Aug. 2	102	99.6	68	71.1	85.4	32	.17	5	1	1
Month of July	102	95.7	64	71.1	83.4	33	2.78	15	15	1

The work of grubbing brush on the unbroken portion of Field ABC-7 continued. A supply of wood was cut and hauled from the waste land along Six-Mile Creek.

Forage sorghum was removed from plots in the rotations and these plots were cultivated to retard weed growth. All fallow plots on Field C-5 and in the rotations were cultivated and weeded.

San Antonio (cont'd)

Milo in the rotations and grain sorghums in the variety test have been threshed. The quality of grain was very good, but the yields, which are given in the following table, were disappointing.

Yields of Milo, Rotation and Tillage Experiments, 1930

Plot	Rotation	Yield Bushels	Rank	Treatment
A4-11	A4-F	18.1	8	Milo, field peas, plowed spring; sorghum, plowed Nov.; cotton, plowed fall; oats, plowed June.
15	G	18.1	8	Milo, field peas, hay, plowed spring; sorghum, plowed Nov.; cotton, plowed fall; oats, plowed June.
A5- 3	A5-A	22.1	3	Milo, plowed July; oats, plowed June; cotton, plowed Nov.
6	B	24.4	1	Milo, plowed July; oats, plowed June; cotton, manure, plowed Nov.
8	C	18.3	6	Milo, plowed July; cotton, plowed fall; oats, plowed June; cotton, plowed Nov.
12	D	23.0	2	Milo, manure, plowed July; cotton, plowed fall; oats, cowpeas, plowed fall; cotton, plowed Nov.
16	E	19.0	4	Milo, manure, subsoiled July; cotton, plowed fall; oats, cowpeas, subsoiled fall; cotton, plowed Nov.
A6- 1	A6-1	0.6	13	Milo, continuously, plowed July.
2	2	0.5	14	Milo, continuously, manure, plowed July.
5	1A	5.4	12	Milo, plowed July; oats, plowed May.
13	D	5.6	11	Milo, plowed fall; corn, plowed July.
B4-14	B4-A	18.6	5	Milo, plowed July; Sudan grass, plowed Nov.; cotton, plowed Nov.
17	B	18.3	6	Milo, plowed July; oats, field peas, plowed spring; cotton, plowed Nov.
B5-17	B5-E	7.7	10	Milo, plowed July; cotton, plowed Nov
Average		14.2		

Milo plots scheduled to be plowed following harvest have been plowed. Fields A5-8, B-4, and D-4 have been plowed with the tractor plow.

Mr. Paul R. Dawson, Associate Biochemist, Bureau of Chemistry and Soils, Austin, Texas, was a station visitor July 29.

I. M. Atkins.

Scotts Bluff

The average maximum temperature for the week ending July 19 was 90° with a maximum of 102 on July 16; the average minimum was 57 with a minimum of 49 on the morning of July 14. One light shower occurred during the week with .13 inch of precipitation, making a total for the season of 8.44 inches. The evaporation for the week was 1.295 inches. The average hourly wind movement for the week was 3.3 miles.

While the precipitation at the station was very light, there have been heavy rains over portions of the project during the week, which will help to lighten the heavy demand for irrigation water.



Scotts Bluff (cont'd)

Harvest is in full swing now. With the exception of the winter wheat plot, no harvesting has been done at the station. Water has been run continuously, and all of the beet plots have received water. The alfalfa in Field H and a part of the plots in Field K have been cut and raked. The rest will be cut as soon as the plots dry up so that the machines can get into it.

Mr. Russell, Soil Chemist of the University of Nebraska, has been in the valley during the week checking up on some of the fertilizing demonstrations that are being carried on various farms. He has about 75 cooperators in these phosphate demonstrations. The farms on which the tests are being made are well distributed over the valley, both on the north and south sides of the river, and on all of the various soil types. It is planned to expand this work during the coming years and give the fertilization idea a thorough test.

The average maximum temperature for the week ending July 26 was 88, with a maximum of 97° on the 26th; the average minimum was 59°, with a minimum of 52 on the night of the 21st. The total evaporation for the week was 1.376 inches. The average hourly wind movement for the week was 3.3 miles. There was no precipitation at the station during the week.

All of the oats plots in Fields K and E were harvested during the week. The wheat plots, with the exception of the winter wheat (Rotation 5), and the two flax plots are not yet ready to harvest.

The second cutting of alfalfa was stacked in splendid condition. The yield was rather poor as the weather conditions and the scarcity of water made it necessary to neglect the alfalfa and use the water on other crops. Some of the alfalfa plots received a small amount of waste water but not enough to cover them sufficiently. The yields are not comparable with those of other years.

The beet plots in Field K were irrigated during the week, and this crop is in the best of condition with a stand possibly a little above normal. Potatoes in this field received another cultivation.

There has been a very strong effort made by the cities and towns along the Platte River in the central and eastern part of the State to compel the Bureau of Reclamation officials to release additional water from the Pathfinder Reservoir because they claim that the natural flow of the river has been wrongfully diverted to storage. This demand will not be granted unless the consent of the ditch companies in the western part of the State, that are the principal users of stored water, is secured. No decision has as yet been reached.

Conditions for the dairy interests are getting a little better in this section as there has been an increase of 5 cents for butterfat in the last two weeks. Prices for poultry products, however, have not increased and are yet below the cost of production in most cases.

The average maximum temperature for the week ending August 2 was 90° with a maximum of 93 on August 1; the average minimum was 61 with a minimum of 59 on the night of July 30. There was no rainfall during the period. The evaporation for the week was 1.776 inches. The average wind movement for the week was 6.0 miles per hour.

The wheat plots in rotations 3, 7, 18, 28, and 48 and the flax plots in rotations 9 and 65 were harvested. Water has been available



Scotts Bluff (cont'd)

throughout the period, and all the corn plots and fields have been irrigated. The potato plots have been irrigated and beets cultivated. Some work has also been done in trimming up the roadways, cutting weeds, and getting ready for the annual picnic on the 14th.

During the week representatives from all of the beet growing States met in Greeley, Colorado, and organized a national beet growers' association with headquarters in that city. Frank Thomas, President of the Nebraska Beet Growers' Association, was made first Vice President of the national association. A suboffice of the association is to be located at Scottsbluff.

James A. Holden.

Yuma

The meteorological data for the month of July are as follows: Mean maximum 106.6, maximum 114; mean minimum 73.4, minimum 64; mean 90; greatest daily range 46; precipitation .35 inch. A total of .31 inch of rain fell on July 31. Eighteen days in the month were clear, ten were partly cloudy, and three were cloudy. During many of the hot days the high maximum temperatures were accompanied by high humidities.

Good stands of corn and milo have been obtained in nearly all the rotation plots. Thinning operations are now practically finished. The corn was thinned to an average distance of 18 inches and the milo to 15 inches. The variety Double Dwarf milo was again planted this year. This is the second year this variety has been used in the rotations.

The first crop of alfalfa seed has been cut and shocked. The sweet clover seed was also cut and shocked. Severe winds on July 30 scattered much of the alfalfa seed and probably caused a great deal of it to be shattered to the ground.

The cotton on the station is making very satisfactory progress. There seems to be only a slight amount of shedding this year. In the earlier plantings some of the lower bolls are open. The first bale of cotton in the Yuma Valley was ginned during the past week.

A. W. Skuderna and H. A. Elcock, of the Office of Sugar Plants, visited the station on July 30. Their interest was centered largely on the possibility of growing sugar beet seed in this area.

Arthur T. Bartel.



W E E K L Y R E P O R T S
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Vol. XXXII

August 9, 16, and 25, 1930

No. 16

Huntley

Drought and hot weather continued during the three-week period ending August 9. There has, however, been no serious shortage of irrigation water and crops are in fairly good condition. The outlook for sugar beets is particularly good, and early estimates indicate that yields of this crop will be from two to three tons above the average. Crops are extremely short on dry lands, and there is a shortage of feed in many parts of the State.

The local alfalfa crop is good. The farm price of hay so far is from \$8 to \$9 a ton. The second crop of alfalfa on the station was harvested on July 20. The average yield in the rotation experiments was 1.57 tons per acre and in the variety test as follows:

Grimm	2.33	tons	per	acre
LaFak	2.04	"	"	"
Common Montana	2.07	"	"	"
Cossack	2.17	"	"	"
Baltic	2.09	"	"	"

Other station work included irrigating and weeding. The harvest of most of the irrigated grains was completed during the week ending August 9.

Station visitors during this period were S. H. Hastings, A. C. Dillman, and Allen Clark of the Department of Agriculture, and Elwood Morris and J. E. Post of the Montana Experiment Station.

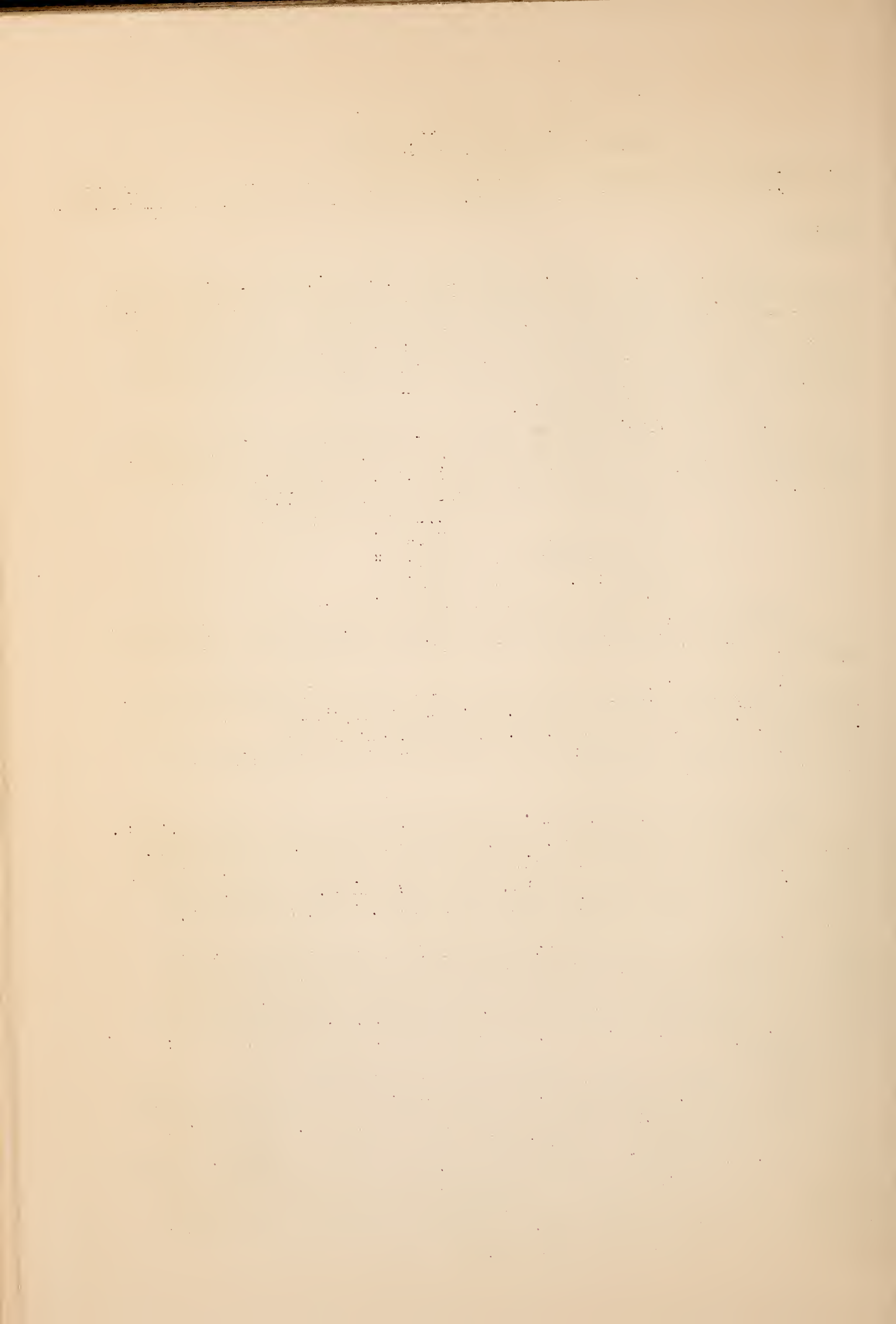
The maximum temperature for this period was 102, minimum 46, and precipitation .51 inch.

The weather continued hot and dry during the week ending August 23. The maximum temperature recorded was 94, minimum 48, and precipitation .24 inch. A severe hailstorm in the upper part of the valley resulted in heavy losses to beans, beets, and alfalfa. This storm covered an area about 5 miles square but did not reach the Huntley project.

The rather serious shortage of feed in many sections of the State is resulting in many local inquiries for hay and other feeds. Some hay has been sold at from \$8 to \$10 per ton. The bean market has shown improvement during the past few weeks, and large amounts of beans held over from 1929 are being sold now at \$5.25 to \$5.50 per hundredweight.

The harvest of Great Northern beans is beginning in most parts of the valley, with indications that the yields will be above average.

The annual Huntley Project Picnic was held in Project Park, adjacent to the station, on August 16. The attendance was estimated to be about 2,000 people. Speakers at this meeting were Representative Scott Leavitt and Director W. B. Linfield of the Montana Experiment Station. Twenty-five members of the Montana Irrigation and Drainage Institute visited the station on the date of the picnic and viewed the experiments under way at the station.



Huntley (cont'd)

Threshing of grains was completed during the week. Yields obtained are given in the following tables.

Yields of oats in the irrigated rotations in 1930

Rotation Number	Plot Number	Y i e l d			Ratio of grain to straw (pounds)
		Pounds per plot		Bushels per acre, grain	
		Grain	Straw		
1	K- V- 21	250	190	31.3	1 : 0.760
16	- 2	581	439	72.6	1 : 0.756
22	- 7	620	560	77.5	1 : 0.903
23	- 15	808	752	101.0	1 : 0.931
24	- 10	564	416	70.5	1 : 0.738
25	- IV- 5	929	881	116.1	1 : 0.948
27	- V- 19	325	375	40.6	1 : 1.154
28	- 18	208	282	26.0	1 : 1.356
30	- IV- 13	549	381	68.6	1 : 0.696
31	- III- 14	536	614	67.0	1 : 1.146
32	- IV- 19	481	329	60.1	1 : 0.684
42	- 7	869	701	108.6	1 : 0.807
44	- 12	870	760	108.8	1 : 0.874
60	- III- 11	991	779	123.9	1 : 0.786
61	- 5	1,090	900	136.3	1 : 0.826
1a	L- IV- 1	350	530	43.8	1 : 1.514
34	- 4	526	354	65.8	1 : 0.673
35	- 8	731	529	91.4	1 : 0.724
46	- 12	885	1,005	110.6	1 : 1.136
64	- 17	765	515	95.6	1 : 0.672
69	- 24	911	819	113.9	1 : 0.899
Average		659	577	82.4	1 : 0.904

Yields of wheat in the irrigated rotations in 1930

Rotation Number	Plot Number	Y i e l d			Ratio of grain to straw (pounds)
		Pounds per plot		Bushels, per acre, grain	
		Grain	Straw		
3	K- V- 23	166	194	11.1	1 : 1.169
18	- 3	510	550	34.0	1 : 1.078
28	- 17	252	278	16.8	1 : 1.103
37	L- I- 3	712	888	47.5	1 : 1.247
47	- 11	651	879	43.4	1 : 1.350
49	- 7	749	1,061	49.9	1 : 1.417
Average		507	642	33.8	1 : 1.227

Huntley (cont'd)Yields of flax in the irrigated rotations in 1930

Rotation Number	Plot Number	Y i e l d		Bushels per acre, grain	Ratio of grain to straw (pounds)
		Pounds per plot Grain	Pounds per plot Straw		
9	K-III- 16	104	186	7.4	1 : 1.788
67	- II- 5	317	713	22.6	1 : 2.249
Average		211	450	15.0	1 : 2.019

Yields of wheat, Field L-II, 1930

Plot Number	Y i e l d		Bushels per acre, grain	Ratio of grain to straw (pounds)
	Pounds per plot Grain	Pounds per plot Straw		
L- II- 1-a	534	596	71.2	1 : 1.116
-b	508	672	67.7	1 : 1.323
- 2-a	506	394	67.5	1 : 0.779
-b	480	420	64.0	1 : 0.875

All plots cropped to potatoes in 1929.

Plot 1-b treated with ammonium sulphate at rate of 400 pounds per acre in spring of 1929.

Plot 2-b treated with treble-superphosphate at rate of 400 pounds per acre in spring of 1929.

Dan Hansen.

San Antonio

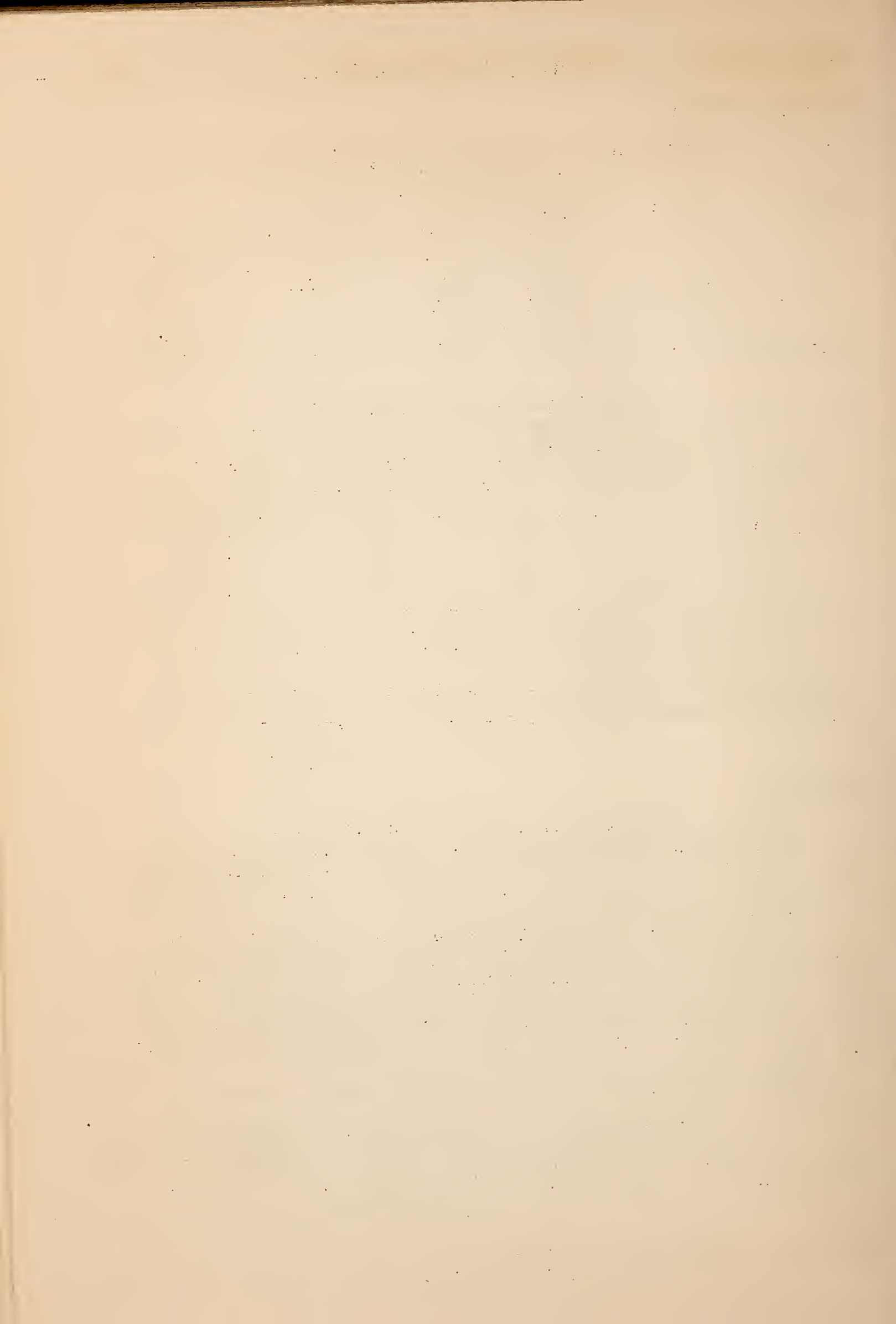
Report for the period ending August 16.

The weather continues dry and hot. Maximum temperatures have been 100° or above every day during the past week. The mean temperatures for each of the past two weeks are higher than the 23-year average for August of 84.7° F.

No precipitation of value has occurred since early in July. Forage crops have made practically no growth since the first cutting. Cotton has suffered from the drought and bolls have dried open in many cases. The dry weather is favorable for picking cotton, and all available labor is being utilized for that purpose throughout the southern part of the State. Picking of cotton on the station will be started next week.

Meteorological data recorded during the two-week period were as follows:

Week ending	Temperature					G. D. R.	Pre-cipitation (inches)	Aspect of the sky		
	Maximum Absolute	Mean	Minimum Absolute	Mean	Mean			Clear	Partly cloudy	Cloudy
Aug. 9	100	98.9	70	73.0	85.9	28	---	days	days	days
" 16	103	101.3	69	71.6	86.4	34	---	6	1	0



San Antonio (cont'd)

Corn in the rotations has been harvested. Although yields have not yet been computed, field weights indicate that the average yield will be slightly under 30 bushels per acre. The quality of corn is good. The second crop of Sudan grass hay has been harvested. The plants were firing and the quality of the hay was deteriorating fast.

Corn plots scheduled for summer plowing were plowed following corn harvest. Fallow plots in the rotations and other plots requiring cultivation for weed control were disked. Orchards and nurseries in field A-1 were irrigated and weeded as necessary.

I. M. Atkins.

Scotts Bluff

The average maximum temperature for the week ending August 9 was 89° with a maximum of 95 on the 3d; the average minimum was 63 with a minimum of 60 on the night of the 8th. The average hourly wind movement for the period was 4.5 miles. The precipitation for the week amounted to 2.04 inches, bringing the total for the growing season up to 10.48 inches, which is about normal.

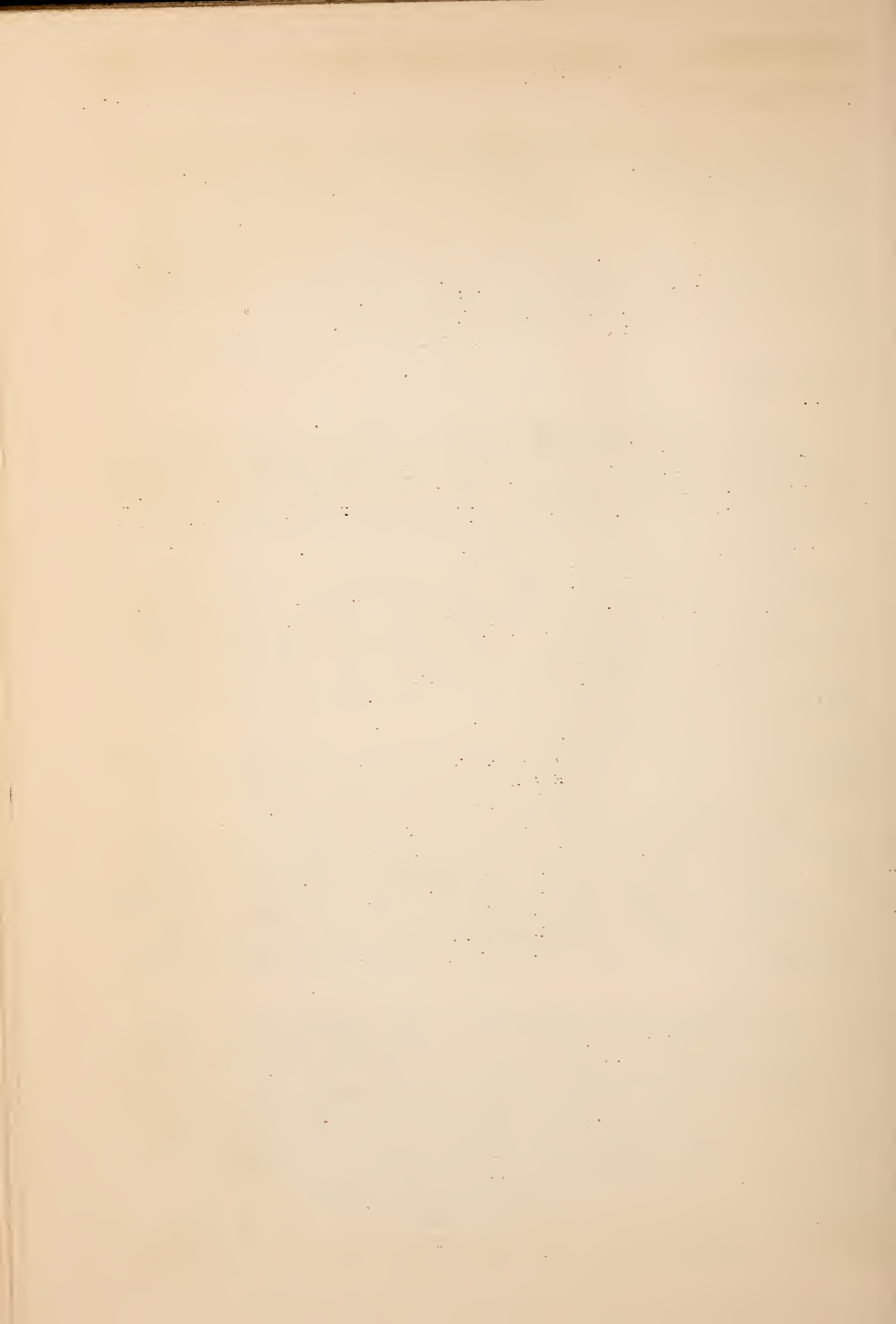
There were four good showers at the station during the week, ranging from .23 inch to .85 inch. The last one was a fairly general rain over the project, the others being local showers, but during the week practically every part of the valley got some good rains and the hot weather seems to have ended. These rains will help out greatly in the irrigation of young alfalfa and sweet clover, which in many cases was beginning to suffer. Crops of all kinds are in very good condition all over the project.

In the irrigated rotations water was run continuously, the beets being watered for the third time and the potatoes the second time. During the week the manure spreader has been kept busy cleaning out the hog pens and cattle corrals and fertilizing grass pastures.

Two cow-testing associations have been organized in the valley, including that portion of the project in Wyoming. H. L. Gibson, County Agent of Goshen County, Wyoming, is in charge of the western division, and E. C. Nelson, County Agent of Morrill County, Nebraska, is in charge of the eastern division, both of them being under the general supervision of D. H. Propps. Two testers have been sent out by the dairy department at Lincoln, and testing was to commence the latter part of this week.

The average maximum temperature for the two-week period ending August 23 was 82° with a maximum of 94 on the 20th; the average minimum was 58 with a minimum of 48 on the night of the 17th. The precipitation for the period was 2.67 inches, making a total rainfall for the growing season of 13.15 inches. This is about 25 per cent above the normal for the growing season to date. The rainfall for the month to this date has been 4.71 inches as compared with an average of 1.90 inches. The average hourly wind movement for the two weeks has been 5 miles.

The first week of the period was devoted largely to getting ready for the annual picnic on Thursday, August 14. There had been considerable rain the first part of the week and the crowd was smaller than usual on account of it. The forenoon was devoted to the demonstra-



Scotts Bluff (cont'd)

tions of the boys' livestock clubs, the girls' cooking and clothing clubs, and the children's athletic events. Rain commenced falling soon after lunch and continued practically all the afternoon and evening. No field tours were made at all.

On Sunday, the 17th, a very destructive hailstorm did considerable damage over a small strip of country in the Sunflower District just north of the station. It was accompanied by a heavy rain. The hail did no damage to the crops on the station, but the flood of water from the north coming down the laterals overflowed the ditch banks and washed some of the fields rather badly.

The annual tour of the Potato Growers' Association was held during the latter part of the period. Many local growers as well as representatives from the Southern States inspected fields in the potato section in Kimball, Banner, Scotts Bluff, Sioux, and Box Butte Counties.

Because of the wet weather during the period no irrigation has been necessary. Crops are in splendid condition. Alfalfa and sweet clover seeding is making good growth and generally a fine stand has been obtained all over the valley.

James A. Holden.

Yuma

The maximum temperature for the week ending August 9 was 109, minimum 68, and greatest daily range 35. Most of the week was cloudy, but only 0.04 inch of rain was recorded.

All the milo and corn plots in the rotations have been thinned. Most of them were irrigated for the first time early in the week. Attempts were made to kill out all the Bermuda grass before the plots received their first irrigation.

The sweet clover seed in rotations 28 and 36 has been threshed. Higher yields were obtained this year than during previous years. The yields of sweet clover seed from 1928 to 1930, inclusive, are as follows.

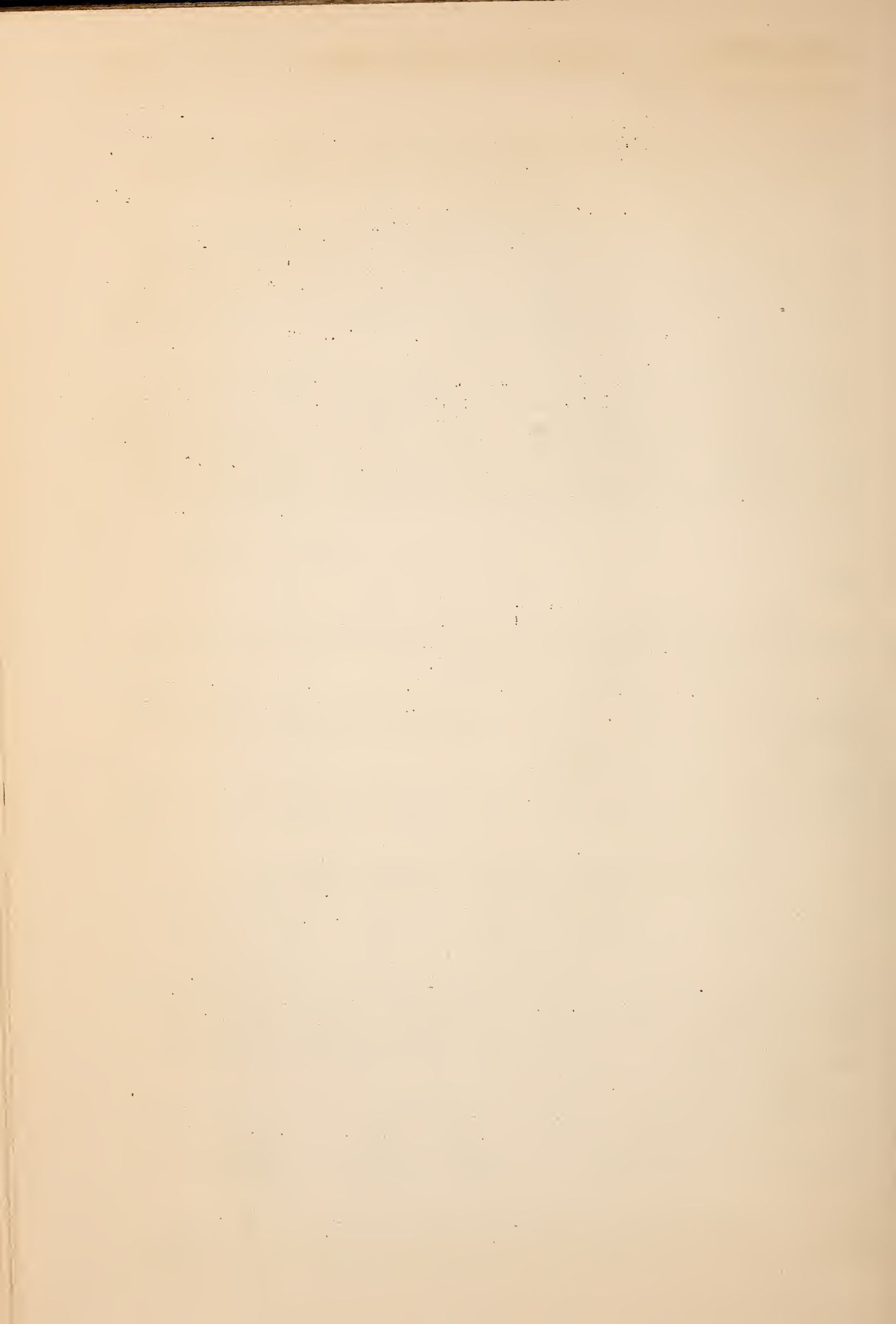
Rotation Number	Pounds of seed per acre			
	1928	1929	1930	Average
28	80	108	372	187
36	64	264	508	279

The sweet clover in rotation 28 is broadcasted on the ground at the same time the barley is sown. The barley acts as a nurse crop. After the barley is harvested the sweet clover remains and produces seed. In rotation 36 the sweet clover is planted in rows 42 inches apart and is allowed to produce seed.

A few of the earliest dates have started to ripen. Many others have changed in color and are due to ripen soon.

Dr. John E. Martin, Office of Cereal Crops and Diseases, Bureau of Plant Industry, and Prof. G. W. Hendry, Department of Agronomy of the University of California were station visitors on August 9.

The meteorological data for the week ending August 16 are as follows: Maximum temperature 107, minimum 60, greatest daily range 46, precipitation 0. All the days in the week were clear. The weather was



Yuma (cont'd)

very favorable, the minimum temperatures ranging from 60 to 67 degrees.

The threshing of the first crop of alfalfa seed has been completed. In rotation 56 the second and third years of alfalfa are used for seed, the second cutting being saved for this purpose. The second year of alfalfa yielded 412 pounds of seed per acre, and the third year yielded 228 pounds in 1930. Another crop of seed will be obtained this year from each of these plots. The yield of alfalfa seed in rotation 64 was 200 pounds per acre. Here the third cutting of hay was saved for seed.

Heavy rains in northern Arizona have caused the water level in the Colorado River to be almost as high as it was in the high-water stage some time ago. The irrigation water now carries an exceptionally large amount of silt due to the rains.

Station visitors for the past week were as follows: Roland McKee, Office of Forage Crops, on August 12; C. J. King, Office of Cotton, Rubber, and Other Tropical Plants and Superintendent of the U. S. Field Station at Sacaton, Arizona, on August 15; and S. H. Eastings on August 15.

The maximum temperature for the week ending August 23 was 112, minimum 60, and greatest daily range 48. No precipitation was recorded.

Most of the time during the past week has been spent in building the foundation for the new cotton gin. As the volunteer plot of cotton is now ready to be picked, the building of the gin will be rushed as much as possible.

The flow of water in the Colorado River is again on the decline. During the recent rise the highest mean discharge was 48,700 second feet. This occurred on August 16.

Station visitors on August 21 and 22 were Mr. S. H. Hastings, Office of Western Irrigation Agriculture, and Dr. T. E. Kearney, Office of Egyptian Cotton Breeding.

Arthur T. Bartel.



W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII

August 30 and September 6, 1930

No. 17

Belle Fourche

Under date of September 5 Mr. Beyer Aune reported as follows:

"Last week the Sugar Company conducted a beet tour over the project, and gave a dinner to about 150 people here at the Field Station. The irrigated rotations and maximum production experiments were inspected and much interest was manifested, particularly in the beets.

"The County Fair was held at Nisland the last of the week, and all departments were crowded to the limit."

Huntley

The maximum temperature for the week ending September 6 was 90, minimum 29, and precipitation .03 inch. Weather conditions were favorable during this period and good progress was made in the harvesting of beans and the third crop of alfalfa, which is under way in all parts of the valley. A light frost occurred on September 1 when the minimum temperature was 29. No serious crop damage resulted from this frost.

Great Northern beans are selling at from \$5.00 to \$5.50 per hundredweight, and several cars have already been loaded at this price. Yields are reported to be better than average. Garden seed beans, of which there are several hundred acres on the project, are selling at a contract price of \$6.50 per hundredweight. Yields from the earlier harvested fields are reported to be from 1,200 to 2,000 pounds to the acre.

At the station the harvesting of silage corn and the third crop of alfalfa was completed, and the bean harvest was begun.

Station visitors during the week were Profs. H. E. Morris and H. T. Post of the Montana Experiment Station and Mr. R. S. Towle of the Sheridan, Wyoming, station.

Dan Hansen.

San Antonio

Typical dry August weather continued to prevail throughout the two-week period ending August 30. No rain has occurred since early in July. Forage crops have made no growth for some time. Much cotton throughout this section was prematurely opened by the drought. Conditions have been favorable for cotton picking, and more than half of the crop in this section has been picked. Rootrot has been checked by the continued dry weather and is spreading slowly.

The following meteorological data were recorded:



San Antonio (cont'd)

Week ending	Temperature						Aspect of the sky		
	Maximum		Minimum		Mean	3. D. R.	Clear days	Partly cloudy days	Cloudy days
	Abso- lute	Mean	Abso- lute	Mean					
Aug. 23	103	100.6	70	71.4	86.0	33	5	2	0
" 30	100	96.0	65	67.4	81.7	33	4	2	1

Note: No precipitation was recorded during this period.

During the week of August 17 to 23 all the laborers on the station and some additional help were utilized in picking cotton. Yields of cotton were considerably below early prospects. Mr. D. D. Porter, Assistant Scientific Aide, Greenville, Texas, was at the station August 18 to 22 supervising the picking of all the cotton experiments that were conducted in cooperation with the Office of Cotton, Rubber, and Other Tropical Plants. Mr. P. R. Dawson, Associate Biochemist, and Mr. Jenkins, of the Bureau of Chemistry and Soils, Austin, Texas, were at the station August 22 and 23 supervising the picking of cotton from the experiments with fertilizers for cotton and on rootrot control. The yields of seed cotton from the rotation and tillage experiments at the Field Station have been computed and are given in the following table:

Plot	Rotation	Rank	Yield lbs.	Treatment
A5-15	A5-E	1	678	Cotton, plowed Nov.; milo, manure, subsoiled June; cotton, plowed fall; oats, cowpeas, subsoiled fall.
A5- 5	A5-B	2	608	Cotton, manure, plowed Nov.; milo, plowed July; oats, plowed June.
A5-13	A5-D	3	560	Cotton, plowed fall; oats, plowed June; cotton, plowed Nov.; milo, manure, plowed July.
B6- 9	B6-E	4	558	Cotton, subsoiled Nov.; corn, manure, field peas, plowed spring.
A5- 9	A5-C	5	556	Cotton, plowed fall; oats, plowed June; cotton, plowed Nov.; milo, plowed July.
B5-10	B5-A	6	550	Cotton, plowed Nov.; sorgo(4.1' rows), plowed Nov.
B5-18	B5-E	7	546	Cotton, plowed Nov.; milo, plowed July.
A5- 7	A5-C	7	546	Cotton, plowed Nov.; milo, plowed July; cotton, plowed fall; oats, plowed June.
B5-12	B5-B	9	544	Cotton, plowed Nov.; sorgo(8" drills), plowed Nov.
B6- 1	B6-A	10	540	Cotton, plowed Nov.; corn, plowed July.
A5-11	A5-D	11	534	Cotton, plowed Nov.; milo, manure, plowed July; cotton, plowed fall; oats, cowpeas, plowed fall.
B6- 7	B6-D	12	516	Cotton, plowed Nov.; corn, manure, field peas, plowed spring.
A5-17	A5-E	13	510	Cotton, plowed fall; oats, cowpeas, subsoiled fall; cotton, plowed Nov.; milo, manure, subsoiled July.
B6- 3	B6-B	14	500	Cotton, subsoiled Nov.; corn, subsoiled July.
A5- 2	A5-A	15	484	Cotton, plowed Nov.; milo, plowed July; oats, plowed June
A4- 8	A4-D	16	480	(Plots bordered) Cotton, plowed Nov.; corn, plowed July.



San Antonio (cont'd)

(Table continued from preceding page)

Plot	Rotation	Rank	Yield	Treatment
			lbs.	
B4-19	B4-B	16	480	Cotton, plowed Nov.; milo, plowed July; oats, field peas, plowed spring.
B4-16	B4-A	18	432	Cotton, plowed Nov.; milo, plowed July; Sudan grass, plowed Nov.
B6- 5	B6-C	19	428	Cotton, plowed Nov.; corn, manure, plowed July.
B6-11	B6-F	20	424	Cotton, plowed Nov.; corn, disked July.
B6-13	B6-G	21	406	Cotton, plowed Feb.; corn, plowed Feb.
A4-17	A4-G	21	406	Cotton, plowed fall; oats, plowed June; milo, field peas for hay, plowed spring; sorgo (8" drills), plowed Nov.
B6-15	B6-H	23	394	Cotton, subsoiled Feb.; corn, subsoiled Feb.
A4-13	A4-F	24	356	Cotton, plowed fall; oats, plowed June; milo, field peas for green manure, plowed spring; sorgo (8" drills), plowed Nov.
A6- 3	A6-3	25	268	Cotton, plowed Nov.
A4-19	A4-19	26	162	Cotton, field peas for green manure, plowed spring.
B5- 3	B5-3	27	144	Cotton, plowed Nov.
B6-17	B6-I	28	140	Cotton, plowed Nov.; corn, rye, plowed Feb.
A4- 2	A4-A	29	136	Cotton, plowed Nov.; fallow (biennially cropped)
B5- 4	B5-4	30	120	Cotton, manure, plowed Nov.

Plowing of the waste land south of the rotation experiments in preparation for planting to alfalfa was started. The pasture near the corrals was plowed in preparation for a winter pasture crop. Soil samples were taken on the cotton plots at the time of picking. A supply of wood was sawed during the past week. Watering of nurseries and care of the grounds has required considerable time during the dry period.

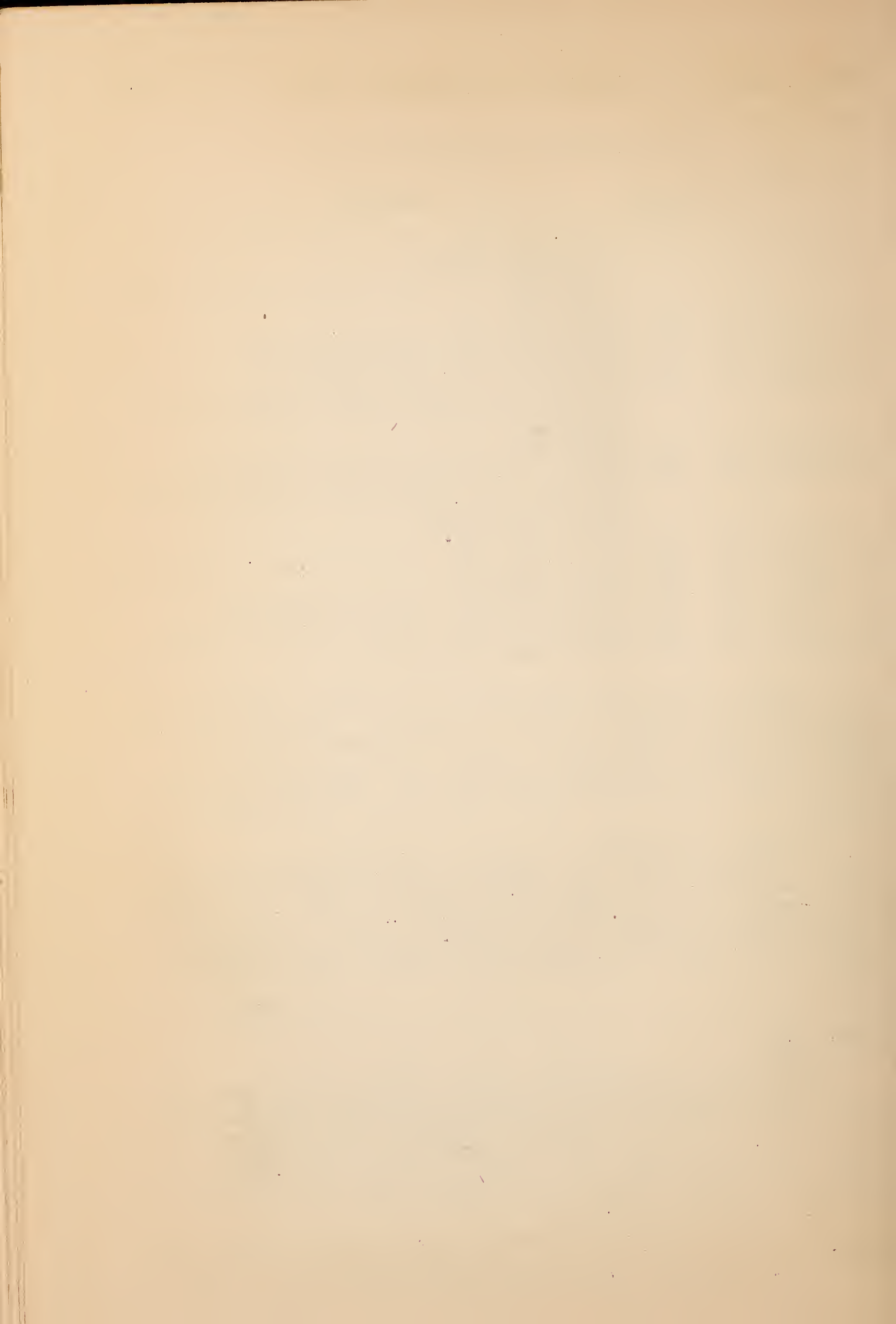
Mr. G. W. R. Davidson, formerly of the Office of Cotton, Rubber, and Other Tropical Plants, now engaged by the Plant Quarantine and Control Administration in phony peach eradication work, was a station visitor August 17. Senor Chapa of the Mexican Agricultural Experiment Station, which is located on a new irrigation project at Rodriguez about 50 miles southwest of Laredo, was a station visitor August 25 and 27.

I. M. Atkins

Scotts Bluff

The average maximum temperature for the week ending August 30 was 82° with a maximum of 88 on the 25th, the average minimum was 55 with a minimum of 51 on the night of the 28th. The evaporation for the week was 1.322 inches. The average hourly wind movement was 4.6 miles. The rainfall amounted to 0.99 inch for the week, making a total for the growing season of 14.14 inches, which is about one-third above the normal for the period.

The precipitation for the month of August was 5.70 inches, the heaviest recorded since the station has been established. The average rainfall for August for the 18 years records have been kept at the



Scotts Bluff (cont'd)

station, omitting this year, was 1.77 inches. This year it has been more than three times the average.

In 1924 a weather chart was prepared in this office showing the climatological data for the years 1912 to 1923, inclusive. This chart showed that the average rainfall for the growing season, April to September, for this 12-year period was 12.54 inches, and for the year it was 15.35 inches. This summer the chart has been revised to include the years 1912 to 1929. The average for the growing season for this longer period is 12.28 inches and for the year 15.05 inches. The rainfall for the last six years has been below normal, so that the average for the entire period has been reduced about one-third of an inch. All of the shortage in rainfall has evidently come in the growing season, as the loss in both periods is practically the same.

Little field work has been possible because of weather conditions. The cutting of the third crop of alfalfa has been delayed with the hope that the rains would stop. Threshing has also been delayed, and there will probably be some loss in yields as there is considerable shattering of the grain on the outside of the shocks. Beets and potatoes are making good growth. A few potato fields are being harvested, but the main crop will not be ready for some time. Hailstorms have occurred in one or two localities and some damage was done.

The following table summarizes the results with poultry at this station for the year September 1, 1929 to August 31, 1930:

Months	Number of hens	Total number of eggs	Average per hen	Average price per dozen	Total sales			Total cost			Profit
					Eggs	Culls	Total	Feed	Supplies	Total	
<u>1929</u>					\$	\$	\$	\$	\$	\$	\$
September	410	1934	4.7	31.7	51.15	58.41	109.56	36.60	5.00	41.60	67.96
October	410	3951	9.6	40.8	134.45	0.00	134.45	43.20	0.00	43.20	91.25
November	401	3802	9.5	47.6	150.80	127.93	278.73	38.60	.83	39.43	239.30
December	394	2838	7.2	47.5	112.34	68.62	180.96	43.51	.10	43.61	137.35
<u>1930</u>											
January	388	3295	8.5	36.6	100.61	0.00	100.61	39.75	0.00	39.75	60.86
February	382	5660	14.8	30.1	140.13	0.00	140.13	50.71	3.75	54.46	85.67
March	375	6638	17.7	20.2	110.82	0.00	110.82	29.25	22.85	52.10	58.72
April	370	6322	17.1	19.5	102.72	0.00	102.72	59.45	2.85	62.30	40.42
May	364	6646	18.2	17.5	96.96	21.87	118.83	82.85	0.00	82.85	35.98
June	359	5973	16.6	16.0	79.64	4.68	84.32	73.80	0.00	73.80	10.52
July	352	4577	13.0	17.0	64.84	13.50	78.34	67.95	0.00	67.95	10.39
August	349	3336	9.6	18.3	50.87	52.52	103.39	27.20	0.00	27.20	76.19
Totals	---	54972	146.4	-	1195.33	347.53	1542.86	592.87	35.38	628.25	914.61
Av. for mo.	380	4581	12.2	26.1	99.61	28.96	128.57	49.41	2.94	52.35	76.22

The average maximum temperature for the week ending September 6 was 79° with a maximum of 86 on the 3d, the average minimum was 49 with a minimum of 44 on the nights of August 31 and September 1. The average hourly wind movement was 4.7 miles. The precipitation was .41 inch,



Scotts Bluff (cont'd)

making a total for the season of 14.55 inches. The daily evaporation averaged 0.164 inch.

The first of the week water was turned on, and the beets in Field K have been watered and a part of the plots in Field E irrigated. There were two showers during the week, but neither of them was heavy enough to supply moisture for beets.

The third cutting of alfalfa was put in the shock during the week. Considerable hay was down during the past week, and it has been damaged a good deal. All other crops are growing fine except some of the potatoes, which have been rather badly damaged by blight. It is scattered rather widely, but not all fields are affected by it.

The price of potatoes is gradually working up, and buyers are now offering \$1.20 per hundred.

James A. Holden.

Yuma

The maximum temperature for the week ending August 30 was 114°, minimum 68, and greatest daily range 46. There was no precipitation. All the days in the week were clear.

During the week the corn in the rotations was cultivated for the last time this season. The worm injury to the corn and also to the milo plants exceeds that of ordinary years. All the milo in the rotations was rogued for mixtures and hybrids.

The Sesbania (wild hemp) on borders B-3, 4, 7, 8, and 18 was plowed under as a green manure crop the latter part of the week. This crop made very good growth this year. In many sections of each border a height of nine feet was attained. Sesbania is probably used more as a green manure than any other crop grown in the Yuma Valley.

The maximum temperature for the week ending September 6 was 110, minimum 71, greatest daily range 39, precipitation 0. The meteorological data for the month of August are as follows: Mean maximum temperature 105.1, maximum 114; mean minimum 70.3, minimum 60; mean 87.7; greatest daily range 48; precipitation 0.08 inch. Twenty-one days in the month were clear, six were partly cloudy, and four were cloudy.

The ginning of cotton in the Yuma Valley is now in full sway. A total of 2,341 bales have been ginned so far this season. At this date in 1929 there were 1,788 bales ginned. Although the present price of cotton is very low, being about 10 cents per pound, an increase is expected.

Mr. S. H. Hastings was a station visitor on September 6 and 7.

Arthur T. Bartel.



W E E K L Y R E P O R T S
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Vol. XXXII

September 13 and 20, 1930

No. 18

Newlands

Report for period ending September 20

Generally the crops this year have shown about an average yield. As there has been no shortage of water, a large crop of alfalfa hay was produced. The price for alfalfa will probably be below that of last year.

Some feeder sheep are already arriving on the project, and it is probable that many beeves and sheep will be fed during the winter. Because of the high price of hay last year a smaller number than usual were wintered on the project. The surplus hay remaining from the 1929 season is likely to have some effect on the price this year. It is expected that more hay than usual will be shipped as meal.

The State Fair was held September 18 to 21, inclusive. This year the attendance was larger than usual and there were more entries, especially of livestock. The Newlands Field Station exhibited some fruits and stock, more as a matter of educational value than in competition.

The following tables give the yields of the various crops grown on the station this season.

Yields of Ensilage Corn

Plot	Area, acre	Actual yield, lbs.	Yield per acre, lbs.
B-20	.46	5,160	11,217
-21	.46	8,229	17,889
-22	.75	13,925	18,568
D- 3	.76	9,440	12,421
- 6	.76	2,750	3,618
E - 5	.52	6,070	11,673
F- 4	.52	7,525	14,471

Yields of Grain

Plot	Area, acres	Crop	Yield per acre		
			Grain lbs.	Grain & Straw lbs.	Grain bus.
D- 1	.76	Barley	612	2,757	12.7
- 2	.76	Oats	842	3,421	26.3
- 4	.76	Barley	375	1,822	7.8
- 5	.76	Oats	553	2,770	17.3
E- 2	.76	Oats	132	1,118	4.1
- 3	.76	Oats	118	664	3.7
- 4	.76	Wheat	362	1,112	6.0
F- 5	.52	Barley	1,510	2,740	31.4
- 6	.52	Wheat	981	2,346	16.3
Y-18	.45	Wheat	611	1,878	10.2

E. W. Knight

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

REPORT

ON THE

ANALYSIS

OF THE

OF THE

OF THE

OF THE

OF THE

San Antonio

Except for the temporary relief afforded by two small local showers of .65 and .66 inch on September 3 and 8, respectively, the weather has remained dry and hot during the two weeks ending September 13. Any hope which may have been entertained for a top crop of cotton in this section has been dissipated. The last rainfall of real agricultural value was on July 9, the month of August having been practically rainless. The summary of climatological data for August shows that month to have been close to normal in temperature, but 1.39 inches deficient in rainfall. Notwithstanding the fact that the normal August rainfall during the preceding 23 years is 1.46 inches, it is not uncommon for the month to be rainless.

Climatological data for August and the two weeks ending September 6 and 13, respectively, are presented in the following table.

Week ending	Temperature						Pre- cipita- tion	Aspect of the sky		
	Maximum		Minimum		Mean	G. D. R.		Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
Month							inch	days	days	days
of Aug.	103.5	99.4	65	70.9	85.1	34	.07	18	11	2
Sept. 6	103.5	96.9	68	71.4	84.2	29	.65	1	6	0
" 13	101.0	99.0	71	73.6	86.3	27	.66	3	4	0

The plowing of approximately eight acres on field ABC-7 in preparation for the planting of alfalfa this fall was completed. The pistache orchard was again plowed in the attempt to clean up a very heavy Johnson grass infestation.

Orchard and nursery A-1 were irrigated, cultivated, and weeded. The trees in this orchard reflect the irrigations they have received the past summer in the green color of their foliage, which is ordinarily very chlorotic at this season of the year.

Considerable farm labor has been expended in clipping mules, pruning hedges, grubbing brush from fence rows, and general clean-up operations. All field work is completed up to schedule.

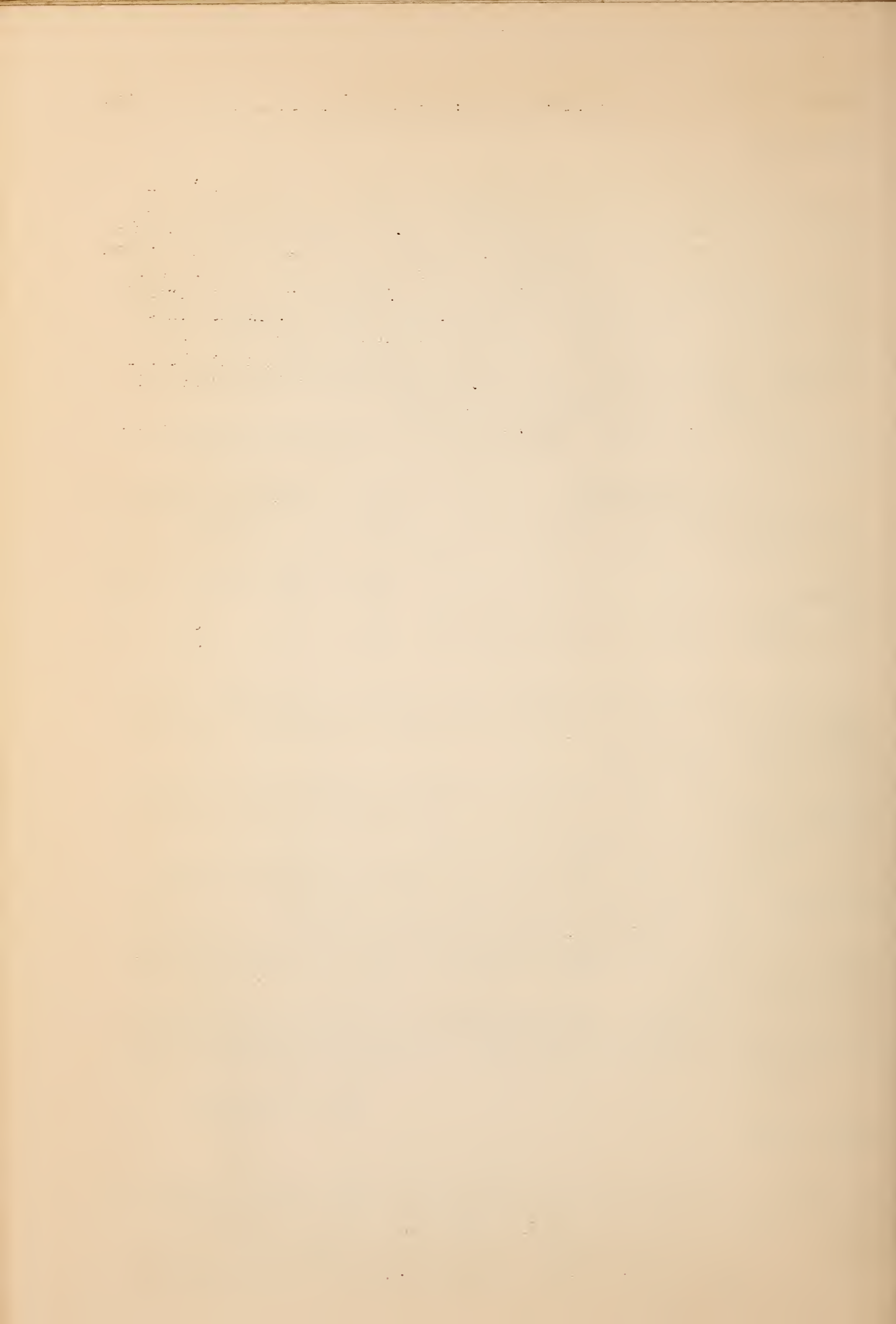
Mr. Paul R. Dawson, Associate Biochemist, Bureau of Chemistry and Soils, visited the station September 5. Mr. S. H. Hastings, Principal Agronomist of this office, arrived the morning of September 13 for a two-day visit.

Mr. I. M. Atkins, Junior Agronomist and Assistant Superintendent at this station since June 1928, left on September 5 for Denton, Texas, to assume his new duties with the Office of Cereal Crops and Diseases.

Geo. T. Ratliffe.

Scotts Bluff

The average maximum temperature for the week ending September 13 was 78° with a maximum of 84 on the 10th, the average minimum was 50 with a minimum of 42 on the night of the 12th. The precipitation amounted to 1.79 inches, making a total of 16.34 inches for the growing season. The hourly wind movement averaged 4.2 miles. The evaporation amounted to .942 inch.



Scotts Bluff (cont'd)

The heaviest single rainfall of the year, 1.49 inches, occurred on the 8th. As soon as possible after this rain the corn binder was started and two of the silos were filled. The hay is still too wet to stack.

The Fortieth Annual Meeting of the Scotts Bluff County Fair was held during the week. The attendance was large and the exhibits of both crops and livestock were considerably beyond the capacity of the buildings. The exhibits of the boys' and girls' livestock clubs are growing in quantity and improving in quality.

The latest crop estimate, which showed a considerable reduction in the potato yield, has brought some strength to the prices ^{and} on the local market there has been an increase of 25 cents a hundred. Buyers are offering about \$1.40, but many of the growers seem to be holding for the higher price which the total yield indicates.

Range sheep men so far have not shown any great interest in the contract that the Lamb Feeders' Association of the valley has adopted. Many of the feeders believe that only the 5-cent lamb gives them any promise of profit. So far as is known, no lambs have been contracted for later delivery in the valley. There is a fairly good movement of feeder lambs into the corn belt at prices ranging from \$6.25 to \$7.25 per hundred.

The Superintendent went to Denver the latter part of the week to get a car of feeder lambs. About a 60-day feeding test will be run with them, using wheat in combination with other home-grown grains.

The average maximum temperature for the week ending September 20 was 75° with a maximum of 83 on the 17th and 18th; the average minimum was 43 with a minimum of 40 on the nights of the 15th and 19th. The average hourly wind movement for the period was 4.3 miles. The evaporation was 1.055 inch. There was no rainfall during the week.

The filling of the three silos was completed during the week. The remainder of the corn is in the shock and will be used for refilling the silos this winter. The three pit silos have a combined capacity of about 150 tons, but this is not sufficient to carry the stock through the year, necessitating refilling the silos during the winter.

A feeding test with 13 pens of lambs will be started next week to determine the value of wheat as a fattening ration for lambs. The lambs averaged 65 pounds at Denver and were in good flesh. They will be fed about 60 days or until the regular winter feeding period will have to commence. The rations to be used are as follows:

<u>Lots</u>	<u>Rations</u>
1	Corn
2	Corn, cake
3	Wheat, corn, cake
4	Wheat (1 part), corn (2 parts), cake
5	Wheat, corn, barley, cake
6	Wheat, corn, pulp, cake
7	Wheat, corn, barley, pulp, cake
8	Wheat, cake
9	Wheat, barley, cake
10	Wheat (1 part), barley (2 parts), cake
11	Wheat, barley, pulp, cake
12	Wheat, pulp, cake
13	Wheat (1 part), pulp (2 parts), cake.



Scotts Bluff (cont'd)

In all lots where the proportion is not stated, the grain is to be fed in equal parts, and the total amount of grain used approximates one pound per lamb per day. Alfalfa and corn silage will also be fed to each lot.

The grain plots were threshed during the week.

During the week the third crop of alfalfa was stacked. It was in fairly good shape considering the climatic conditions the last three weeks while it was in the shock. The first and second cuttings of hay in the valley are of good quality, but the third is of inferior quality. The yield will probably be below the average. A summary of the yields of alfalfa this year from the various plots on this Station are given in the following table.

Rotation	Series	Plot	First cutting	Second cutting	Third cutting	Total
			Tons	Tons	Tons	Tons
65	I	9	1.04	1.36	1.33	3.73
		10	1.94	1.66	1.58	5.18
61	II	9	--	--	1.58	1.58
		10	1.52	1.10	1.78	4.40
		11	1.24	.64	1.68	3.56
40		12	--	--	1.16	1.16
		13	1.32	1.44	1.62	4.38
60	III	9	--	.90	1.46	2.36
		10	1.16	.46	1.48	3.10
		11	1.22	1.04	1.48	3.74
42		12	--	--	.98	.98
		13	1.06	.66	1.56	3.28
62	IV	9	--	.80	1.34	2.14
		10	1.10	.56	1.50	3.16
		11	1.50	.94	1.64	4.08
44		12	.54	.64	1.18	2.36
		13	1.34	.90	1.50	3.74
8	V	1	1.58	1.40	1.24	4.22
64		9	.84	.94	1.42	3.20
		10	1.66	1.26	1.66	4.58
		11	1.56	1.16	1.72	4.44
48		12	.66	.68	1.22	2.56
		13	1.58	1.90	1.44	4.92
71	O	12	1.84	1.20	1.33	4.37
		17	.82	.88	1.48	3.18
		18	1.62	1.48	1.52	4.62
Average			1.05	.92	1.45	3.42

James A. Holden



Yuma

The maximum temperature for the week ending September 13 was 100, minimum 53, greatest daily range 42, precipitation 0.

The Bard vetch that was broadcasted in rotations 10, 20, and 24 has germinated very nicely and a good stand has resulted. The vetch was planted at the rate of 40 pounds to the acre.

All the milo in the rotations has been rogued for the second time. Practically all the plants in the different plots have headed.

During the past week 1594 bales of cotton were ginned in the Yuma Valley, making a total of 3935 bales ginned this season.

The maximum temperature for the week ending September 20 was 108, minimum 51, greatest daily range 50, precipitation 0.

not The alfalfa on D-30 to 37 has been cut for seed. This land has been watered since June 9. The plan to dry up this alfalfa during the hot summer months resulted in a very good setting of seed.

All the alfalfa in the rotations is being disked. The usual summer injury is not so severe as it was last year. On several plots, however, the stand is very poor.

A total of 1965 acres of lettuce have been planted in the Yuma Valley this fall. This is an increase of 500 acres over last year.

The ginning of cotton in the Yuma Valley has not shown much increase. Only 1505 bales were ginned during the past week, making a total for the season of 5440 bales.

Mr. George Harrison, Office of Egyptian Cotton Breeding, and Mr. A. R. Leding, Office of Cotton, Rubber, and Other Tropical Plants, visited the station on September 16.

Arthur T. Bartel.

M I S C E L L A N E O U S

Mr. C. S. Scofield, Principal Agriculturist, left Washington on September 24 for the Far West where he will be engaged until about the middle of November in field work in connection with the boron investigations.

Mr. S. H. Hastings, Principal Agronomist, returned to Washington on September 17 after an extended Western field trip covering a two months' period.

W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII

September 27 and October 4, 1930

No. 19

Huntley

During the week ending October 4 the maximum temperature was 80, minimum 34, and precipitation .23 inch.

The harvest of sugar beets on the project was begun on September 23. Yields are reported to be above the original estimate of an average of 13 tons per acre, and it is probable that it will be a record crop. The first beets have a sugar content of more than 15 per cent, which is also high for the beginning of the harvest.

The threshing of beans in the district is nearing completion, and it is reported that the yields are above average. The price of beans has dropped to \$3.75 and \$4.00 per hundredweight.

At the station the harvest of beans and potatoes was completed and the beet harvest was begun. The yields of potatoes in the irrigated rotation experiments in 1930 are given in the following table.

Rotation Number	Plot Number	Stand, plants per acre	Yield		Per cent marketable tubers
			Pounds per plot	Bushels per acre	
4	K- IV-21	7,936	1,880	125.3	78
20	- V- 5	7,680	1,800	120.0	81
21	-13	7,936	3,940	262.7	86
24	- 9	8,192	1,860	124.0	76
25	- IV- 6	8,192	5,250	350.0	91
26	- V-11	7,936	2,250	150.0	81
27	-20	7,424	1,280	85.3	73
30	- IV-15	8,320	3,000	200.0	82
31	*III-13	8,448	3,770	251.3	89
40	- IV- 1	8,192	4,010	267.3	90
44	-11	8,192	3,440	229.3	89
60	-III-10	8,192	4,430	295.3	95
61	- 4	8,064	5,540	369.3	90
4-a	L- IV- 9	7,840	3,530	235.3	79
34	- 5	8,960	2,870	191.3	73
35	- 7	7,616	4,120	274.7	82
64	-19	8,064	5,270	351.3	86
Average	---	8,070	3,426	228.4	84

The construction of a dairy barn at the station is under way. This barn is of the pen type and is 48 x 80 feet in size with a feed storage loft.

Work has been started on the construction of a three-room addition to the foreman's residence.

The yields of the third crop of alfalfa in the variety test ranged from 1.48 to 1.78 tons per acre. The yields of the third cutting of alfalfa in the rotation experiments ranged from 1.18 to 1.92 tons per acre.

Dan Hansen.



San Antonio

Climatic conditions during the two weeks ending September 27 have been close to normal. No precipitation of consequence was received, and the total for the month to date is only 1.64 inches. Land for fall and winter crops remains too dry to work into good seed-bed condition. A summary of the climatological data for this period follows:

Week ending	Temperature						Pre- cipita- tion, inches	Aspect of the sky		
	Maximum		Minimum		Mean	G. D. R.		Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
Sept. 20	100	95.7	57	64.4	80.1	38	--	days 6	days 1	days 0
" 27	98	92.0	60	67.4	79.7	36	.33	1	5	1

The preparation of land for winter crops has been at a standstill owing to continued drought. Many fields of oats for pasture will be "dusted in" if rain is not received within the near future. The water behind the Medina storage dam has been so low that a recent report stated only a six weeks supply is available. The State Fish and Game Commission is taking steps to save the fish in the lake by moving them to more favorable locations.

Much of the laborers' time has been used in rebuilding and repairing fences, weeding nurseries and orchards, and grubbing Huisache sprouts from the waste area on ABC-3.

Messrs. Homer C. McNamara and Dalton R. Hooton, of the Office of Cotton, Rubber, and Other Tropical Plants, with headquarters at Greenville, Texas, arrived at the station on September 27 for a two-day visit in connection with the cooperative cotton work.

Crib-dry corn samples were given their final weighing and were shelled. The data obtained from the rotation plots are given in the following table, arranged in the order of yield of ear corn in 1930. In the last two columns are given the average yield and rank of each rotation for the past 22 years. It will be observed that the average yield for the current season is slightly higher than the 22-year average from all the rotations. The rotations which have ranked highest over the 22-year period are the ones which are near the top for 1930, with few exceptions.



San Antonio (cont'd)Yields of Corn - Rotation Experiments - 1930

Plot	Rotation	Yield per acre		Shelling percentage	22-year average	
		Ears	Shelled		Yield	Rank
		Bu. - 70#	Bu. - 56#		Bu.	
A6-12	A6-C	39.3	40.1	81.5	31.3	2
A6-16	A6-E	38.7	38.9	80.3	30.4	4
B6-14	B6-G	35.2	35.4	80.3	29.2	11
A4- 4	A4-B	34.6	33.8	78.0	24.3 ^a	18
A6- 8	A6-A	34.4	34.3	79.7	33.0	1
B6-18	B6-I	33.7	33.7	80.0	30.3	6
B6-12	B6-F	33.3	33.9	81.3	30.0	9
B6- 4	B6-B	33.0	33.4	80.9	30.4	3
B6-16	B6-H	32.6	32.2	78.9	28.6	13
B6- 2	B6-A	30.6	30.6	79.8	30.2	7
B6- 6	B6-C	28.9	28.9	80.0	30.0	8
B6- 8	B6-D	28.5	28.3	79.6	29.7	10
B6-10	B6-E	28.3	28.6	80.6	30.3	5
A6-18	A6-F	27.5	26.7	77.7	29.1	12
A6-10	A6-B	27.2	26.9	79.3	27.0	15
B5- 1	B5-1	27.1	27.0	79.5	24.3	17
A6-14	A6-D	24.9	24.9	80.0	27.2	14
B5-16	B5-D	23.5	23.5	80.1	23.3	20
B5-14	B5-C	22.6	22.0	78.1	23.2	21
B5- 2	B5-2	21.3	21.1	79.2	24.9	16
A4- 7	A4-D	21.0	20.9	79.5	24.0 ^b	19
Average	--	29.8	29.8	79.7	28.1	--

a/ Average of 21 years, started in 1910.

b/ Average of 20 years, started in 1911.

Geo. T. Ratliffe.

Scotts Bluff

The average temperature for the week ending September 27 was 70°, with a maximum of 84 on the 21st; the average minimum was 42, with a minimum of 29 on the morning of the 26th. The average hourly wind movement for the week was 7.0 miles. The precipitation amounted to 1.25 inches, making a total for the growing season of 17.59 inches. The evaporation amounted to 1.039 inches.

The first frost of the fall season occurred on the morning of the 26th. The average date for frost in the fall since 1911 has been September 25. The last frost in the spring was on May 23, making a frost-free period of 126 days.

Water has been run continuously during the week. All of the beet plots have been irrigated and the pastures will be watered before the water is shut off on October 1.

Orders have been issued for the delivery of beets on October 4. Great Western Sugar Company officials are expecting a record yield of beets this season.

Potato digging has commenced in many parts of the valley, but the yields have been rather disappointing.



Scotts Bluff (cont'd)

The yields of oats, wheat, and flax in Fields K and E are given in the following table:

Rotation	Plot		Pounds per plot		Bushels per acre	Ratio of grain to straw
	Series	No.	Straw	Grain		
<u>Oats - Field K</u>						
1	I	3	259	181	22.6	1 to 1.43
27		5	258	182	22.7	1 to 1.42
65		8	509	431	53.9	1 to 1.18
23		12	358	552	44.0	1 to 1.02
25		15	306	284	35.5	1 to 1.08
31	II	4	383	397	49.6	1 to 0.96
61		7	499	561	70.1	1 to .89
30	III	4	91	159	19.9	1 to .57
60		7	434	526	65.8	1 to .83
42		14	496	564	70.5	1 to .88
22		16	159	161	20.1	1 to .99
16	IV	2	176	164	20.5	1 to 1.07
32		4	123	167	20.9	1 to .74
62		7	321	509	63.6	1 to .63
44		15	491	599	74.9	1 to .82
24		17	107	143	17.9	1 to .75
45	V	4	351	409	51.1	1 to .86
64		8	324	506	63.3	1 to .64
48		15	391	409	51.1	1 to .96
28		17	203	97	12.1	1 to 2.09
71	O	16	461	409	51.1	1 to 1.10
Average -----					42.8	
<u>Oats - Field E</u>						
13	III	4	131	429	53.6	1 to .31
15		6	515	485	60.6	1 to 1.06
41		8	426	484	60.5	1 to .88
46	IV	2	280	260	32.5	1 to 1.08
17		4	400	390	48.8	1 to 1.03
19		6	441	429	53.6	1 to 1.03
43		8	437	393	49.1	1 to 1.11
43		10	557	553	69.1	1 to 1.01
33	V	6	482	308	38.5	1 to 1.57
47		8	454	406	50.8	1 to 1.12
47		10	518	472	59.0	1 to 1.10
Average -----					52.4	
<u>Wheat - Field K</u>						
16	III	1	150	110	7.3	1 to 1.36
5		18	925	165	11.0	1 to 5.60
7	IV	18	129	91	6.1	1 to 1.41
48	V	14	346	404	26.7	1 to .86
28		16	199	141	9.4	1 to 1.41
3		18	192	88	5.9	1 to 2.18
Average -----					11.1	
<u>Flax - Field K</u>						
9	I	2	178	92	8.2	1 to 1.93
65		7	287	203	18.0	1 to 1.41
Average -----					13.1	



Yuma

The maximum temperature for the week ending September 27 was 98, minimum 50, greatest daily range 48, precipitation 0.

Cotton ginning operations in the Yuma Valley are about normal. During the past week 1552 bales of cotton were ginned, making a total of 6992 bales for this season.

Bard vetch was planted in rotations 7 and 7-A on September 23. The seed was broadcasted in the cotton plots at the rate of 40 pounds per acre. Sour clover was also broadcasted in rotation 7-B on the same date.

The maximum temperature for the week ending October 4 was 96⁰, minimum 45, greatest daily range 47, precipitation 0.

The meteorological data for the month of September are as follows: Mean maximum 98.6, mean minimum 60.8, mean 79.7, maximum 110, minimum 50, greatest daily range 50, precipitation 0. Twenty-one days in the month were clear, seven were partly cloudy, and two were cloudy.

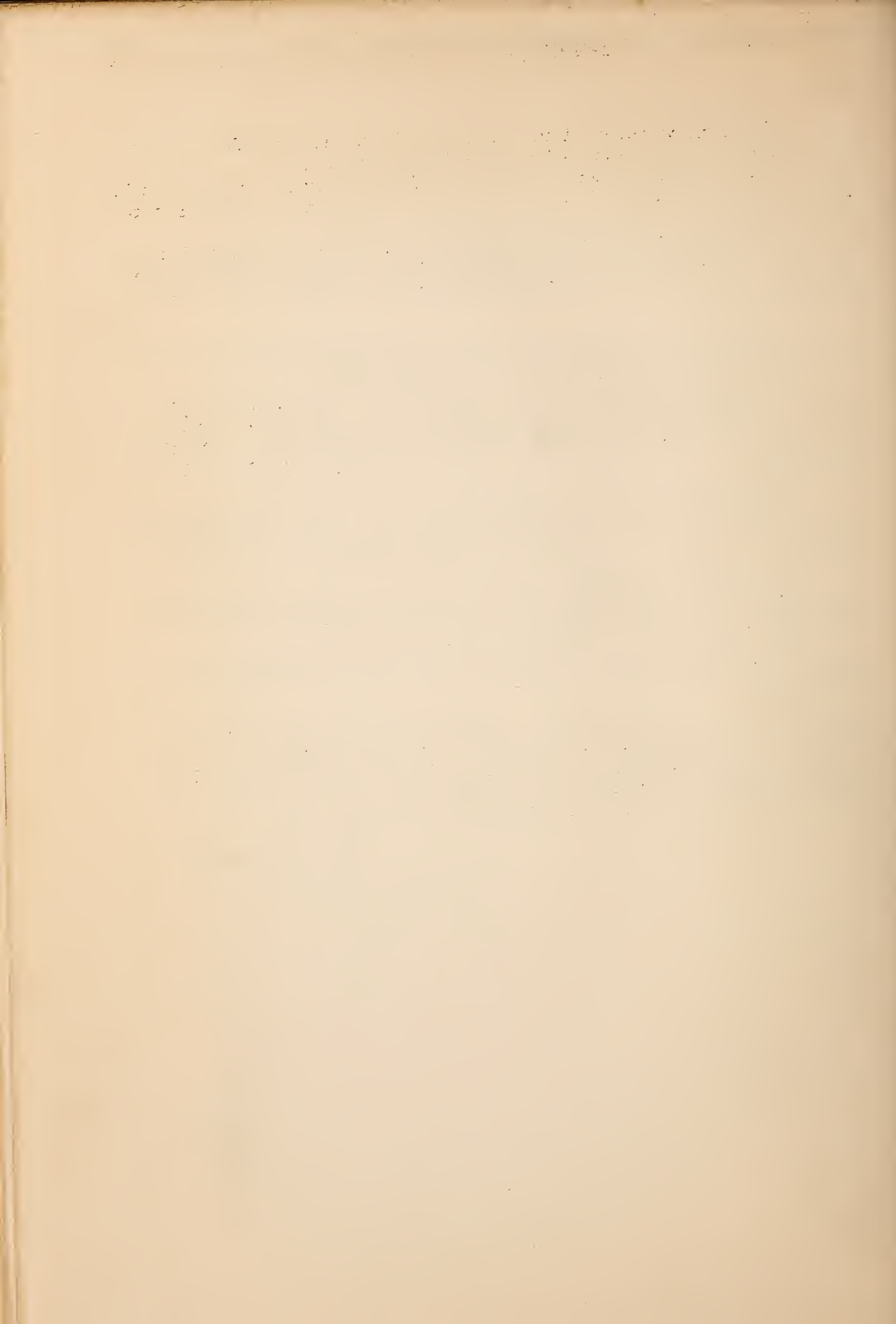
Experiments are being started here to determine the possibilities of sugar beet seed production in this area. The first planting was made on October 2. Several additional plantings will be made this fall on different dates.

On October 4 plantings of Sadie berseem clover, Musgawi berseem clover, and Subterranean clover were made on B-19. The ground was packed with a roller after the seed was drilled.

The total amount of cotton ginned in the Yuma Valley this season is now 8560 bales. In 1929 at this same date 9205 bales had been ginned.

Dr. T. E. Kearney and Mr. George Harrison, of the Office of Egyptian Cotton Breeding, visited the station on September 28 and 29. Mr. J. S. Townsend, of the Office of Cotton, Rubber, and Other Tropical Plants, arrived here on September 29. He will spend some time on the station while installing the new cotton gin.

Arthur T. Bartel.



W E E K L Y R E P O R T S
Of The Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII

October 11, 18, and 25, 1930

No. 20

Huntley

The maximum temperature for the week ending October 25 was 63, minimum 14, and precipitation .43 inch.

The total precipitation from October 1 to 25 amounted to 2.10 inches. Much of this precipitation came in the form of snow and was followed by severe freezing; so that conditions during much of this period were very unfavorable for the harvest of sugar beets, which is only about 50 per cent completed. On the heavier soils the harvest is especially difficult and slow, and it may not be possible to complete this work before the ground freezes.

The threshing of beans was also delayed, but most of the beans that were not threshed before the stormy weather were in stacks and will probably not be seriously damaged.

The lamb-feeding experiment in cooperation with the Montana Station was begun on October 22. This experiment is similar to the one conducted in 1929 except that two lots of lambs are included to test the feed value of wheat. In the test there are ten lots of 30 lambs each, as follows:

- Lot I.- Barley, alfalfa.
- Lot II.- Barley, alfalfa, beet tops.
- Lot III.- Barley, alfalfa, wet beet pulp.
- Lot IV.- Hard wheat, alfalfa, wet beet pulp.
- Lot V.- Soft wheat, alfalfa, wet beet pulp.
- Lot VI.- Corn, alfalfa, wet beet pulp.
- Lot VII.- Barley, alfalfa, wet beet pulp, cotton seed cake.
- Lot VIII.- Barley, alfalfa, wet beet pulp, cotton seed cake, molasses.
- Lot IX.- Alfalfa, wet beet pulp, cotton seed cake, molasses.
- Lot X.- Alfalfa, bean straw, wet beet pulp, cotton seed cake, molasses.

The lambs in this experiment were raised on the range and are rather fine woolled. Their average weight was 69 pounds when started on feed. The lambs are fed on a contract "spread" basis; that is, they were taken in at \$5.00 per hundredweight and will be turned back to the contractor at the end of about 100 days feeding at \$7.25 per hundredweight. Most of the lambs that are being fed locally are handled on a similar contract, the spread, however, in most cases amounting to \$2.00 per hundredweight.

Dan Hansen.

San Antonio

Precipitation varying from slow, soaking showers to violent rain-storms causing severe flood damage have been reported throughout south Texas during the two weeks ending October 11. The movement of livestock out of the range country, which was becoming heavy because of the shortage of feed and stock water, has been stopped. At the station slightly more than two inches of rainfall was recorded, all

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San Antonio (cont'd)

of which came slowly and with no run-off. The precipitation recorded at the station for the first nine months of this year is 4.58 inches below normal. This deficiency has been quite uniform throughout the nine months and was not caused wholly by excessive drought during the summer months.

Temperatures have been close to normal during October, and the mean temperature for the month of September was only 1.7° above normal. A summary of the climatological data recorded for September and for the past two weeks is given below.

Week ending	Temperature						Pre- cipita- tion	Aspect of the sky		
	Maximum		Minimum		Mean	C. D. R.		Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
No. of							Inches	Days	Days	Days
Sept.	101	94.3	57	68.3	81.3	38	1.64	12	16	2
Oct. 4	89	83.7	61	64.9	74.3	28	.63	2	1	4
" 11	93	85.3	58	67.0	76.1	26	1.41	2	2	3

A few fields of early oats, seeded in dry soil, have emerged to excellent stands since the recent rains. Seedbeds for fall planting in those fields which had become too dry to work can now be prepared.

Station activities have included the irrigation and subsequent cultivation of orchard and nursery in field A-1, plowing under cowpeas in two rotation plots, planting oats for pasture in field D-5, ginning cotton from which planting seed is to be saved, and rebuilding approximately 900 feet of our east line fence.

Messrs. Jordan and Hunter, of the Bureau of Chemistry and Soils, visited the station October 7, and Mr. Dawson and Dr. Skinner of the same Bureau stopped for a short visit on October 8.

Messrs. Neal and Eaton, of the Office of Cotton, Rubber, and Other Tropical Plants, arrived on October 10 to make observations in connection with their cooperative cotton rootrot experiments at the station and near Converse, Texas.

Geo. T. Ratliffe.

Scotts Bluff

The average maximum temperature for the two-week period ending October 11 was 69°, with a maximum of 79 on the 8th; the average minimum was 45, with a minimum of 36 on the morning of the 5th. The average hourly wind movement was 5.7 miles. The total precipitation for the period was 2.24 inches, making a total for the year of 20.46 inches, which is about 50 per cent above the normal rainfall. The precipitation during August and September was the heaviest ever recorded at this station for those months.

Water was shut out of the lateral systems on the Interstate Canal on the morning of October 1, closing the season of 1930—a year of unprecedented water demand, even though the total precipitation for the growing season was considerably above normal. The ditches carried their utmost capacity, yet there were no breaks or interferences with water delivery except on some of the smaller laterals.

Scotts Bluff (cont'd)

During the first part of the period the fourth cutting of alfalfa was put into the shock. The last part of the period was devoted to harvesting the potato plots in Fields K and E. All that is left to harvest is a small plot in Field D, which contains some experimental plots grown under the direction of Mr. H. O. Werner of the University of Nebraska.

The yields of potatoes generally are not so high as usual, though many excellent yields have been reported. The yields on dry land in the certified potato area are very much larger than usual. (See page 128 for rest of this report left out here through mistake)

The average maximum temperature for the week ending October 18 was 56° with a maximum of 66 on the 15th; the average minimum was 28, with a minimum of 18 on the morning of the 17th. The precipitation amounted to 0.06 inch.

The latter part of the week was very cold and some damage was done to the potato crop that has not yet been harvested. With nearly two inches of frost in the ground, many of the potatoes were frosted, which will necessitate considerable sorting this winter. Digging has continued during the week when the weather was favorable.

Beet harvest is under full way now as the limit on deliveries was removed earlier than usual, and already many beets are being hauled to the pile. The harvesting of beets has not yet commenced at the station.

The experimental lots of steers that have been on grass in the Government pasture will be brought to the station during the latter part of the period when they will be weighed up and the results of the summer period determined.

The 13 lots of lambs that are now on wheat rations are doing well. They have taken to the ration very readily and seem to be making good gains.

The fall plowing in Field E has been completed. All of these plots were disked prior to plowing. The winter wheat plot (Rotation 5) was seeded on the 15th.

The landowners in the valley are very much pleased with the outcome of the fight they have made before the Interior Department at Washington to get the profits from the power plants that are now operated on the projects. They contended that their contract provided that these profits should be applied to the payment of the construction charges on lands under the Interstate, Fort Laramie, and Northport districts. Their claims were upheld by the Secretary on every point, according to dispatches from Washington. It is thought that the profits from this source will largely pay the construction charges.

James A. Holden.

Yuma

The maximum temperature for the two-week period ending October 18 was 98, minimum 42, and greatest daily range 47. On October 10 there was a precipitation of 0.15 inch. All the days in this period were clear.

The last year of alfalfa in rotations 42, 46, 50, 60, and 32 has been plowed under. The lands were then leveled. Rotation 42 will

Yuma (cont'd)

be planted to wheat, and the other four rotations will be planted to barley.

Cotton ginning in the Yuma Valley is not making the usual progress. Only 1343 bales were ginned during the past week, thus bringing the total for the season up to 11,522 bales. This total is about 2,000 bales less than had been ginned in 1929 at this date and about 5,000 bales less than in 1928.

Mr. R. W. Nixon, of the U. S. Date Garden at Indio, California, was a station visitor on October 9 and 10. Mr. Nixon spent this time in inspecting the dates on this station and in the Yuma Valley.

The maximum temperature for the week ending October 25 was 95, minimum 45, and greatest daily range 49. No precipitation was recorded.

The Double Dwarf milo in the rotations is beginning to ripen, and heading was started the past week. Cotton picking was also started on B-6, the volunteer plot of Pima cotton.

The first carload of grapefruit this season was shipped from the Yuma project last week. This year's fruit is said to be of smoother texture and thinner skin than it was last year. It is estimated that about 130 packed cars of citrus will be shipped this year.

Arthur T. Bartel.

Belle Fourche

Under date of October 27 Mr. Aune reported as follows:

"The first 15 days of October some precipitation occurred every day. The week of October 12-18 was cold and stormy. Some snow fell on the 19th, and the temperature was 16° above zero. This cold weather delayed all field work.

"The lamb-feeding experiment was started on October 10 when 560 range lambs were divided into 14 lots. They will be fed the same kind of rations that were used in these experiments during the last two years. The grade of lambs this year is very good, their average weight being 66 pounds. It has been estimated that 40,000 lambs are being fed on the project at this time.

"The beet harvest on the project is well along at this time, and the yields are satisfactory."

M I S C E L L A N E O U S

Mr. C. C. Wright has left Prosser, Washington, to accept a position in the agricultural service of the Bureau of Indian Affairs. His headquarters are at Sacaton, Arizona.

Scotts Bluff (cont'd)

Forty-two hogs were sold off sweet clover pasture during the period. They averaged 216 pounds each and brought \$9.15 per hundredweight at the station.

Mr. Lionel Harris of Utah reported for duty at the station on October 8. He will have charge of the horticultural work.

On account of rainy weather that interfered with beet harvesting the factories were late in getting started this year. Slicing did not commence until October 6 at Scottsbluff and at the other factories a few days later.

W E E K L Y R E P O R T S
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Vol. XXXII

November 1, 8, and 15, 1930

No. 21

Belle Fourche

Under date of November 11, Mr. Aune reported as follows:

"The weather has been ideal for all kinds of work from the 20th of October to the present time. The beet harvest is practically completed in this territory. The yields, on the whole, have been satisfactory; but the per cent of sugar was not as high as was expected. The field work on the farm is practically completed except some leveling in Field I, which will be done if the weather is favorable.

Sugar Beet Yields in the Irrigated Rotations, 1930

Rotation No.	Plot No.	Pounds per plot	Tons per acre	Rank	Per cent of sugar	Per cent purity	Pounds of sugar per acre	Plants per acre	Av. Weight per beet Ozs.
2-a	III-30	2,846	5.69	25	16.2	85.8	1,582	20,830	8.7
2-m	I-45	6,492	12.98	14	17.3	89.1	4,001	25,180	16.5
18	25	3,784	7.57	23	16.6	86.6	2,176	22,320	10.9
19	44	4,462	8.92	20	17.5	89.1	2,782	20,570	13.9
20	27	7,361	14.72	7	17.9	88.5	4,664	25,320	18.6
21	29	10,790	21.58	1	17.3	88.2	6,586	27,140	25.4
22	31	5,423	10.85	18	16.6	89.7	3,231	25,920	13.4
23	33	7,902	15.80	5	17.1	89.2	4,820	26,300	19.2
29	47	3,954	7.91	22	17.4	88.5	2,436	21,000	12.1
30	18	4,176	8.95	19	17.7	88.4	2,801	23,620	12.1
31	21	6,386	12.77	16	17.8	88.5	4,023	25,580	16.0
32	III-12	4,312	8.62	21	18.0	88.9	2,759	24,600	11.2
34	II-43	7,424	14.85	6	18.0	89.3	4,774	25,560	18.6
35	46	8,243	16.49	3	18.5	89.5	5,460	25,750	20.5
40	I- 4	7,019	14.04	11	16.9	86.2	4,091	25,970	17.3
42	8	6,560	13.12	13	17.1	87.2	3,913	22,780	18.4
46	II- 5	2,858	5.72	24	15.8	86.9	1,571	22,780	8.0
47	III-42	11,680	14.38	8	17.9	89.5	4,607	26,240	17.5
49	I-49	6,106	12.21	17	15.7	86.6	3,320	24,890	15.7
49	50	7,085	14.17	10	16.6	89.3	4,201	24,020	18.9
60	11	6,908	13.82	12	17.6	87.6	4,262	25,540	17.3
61	II-15	10,123	20.25	2	16.5	88.4	5,907	25,270	25.6
62	9	6,406	12.81	15	16.7	85.6	3,663	27,220	15.1
64	III-44	8,150	14.38	9	16.9	87.0	4,228	24,410	18.9
66	II-25	1,175	2.35	26	14.5	83.4	568	11,830	6.4
71	36	7,931	15.86	4	16.6	86.8	4,571	26,230	19.3
Maximum		11,680	21.58	--	18.5	89.7	6,586	27,220	25.6
Minimum		1,175	2.35	--	14.5	83.4	568	11,830	6.4
Average		6,368	12.34	--	17.0	87.8	3,731	39,180	16.0

Note: Plot III-42 contains approximately .39 acre.

Belle Fourche (cont'd)Yields of Irrigated Sugar Beet Varieties, 1930

Variety	Plants per ac- re, av.	Yield per acre		Aver- age yield	Per cent sugar	Per cent purity	Av.wt. per beet	Sugar per acre
		First plot	Second plot					
		Tons	Tons	Tons			Ozs.	Lbs.
Schreiber	23,550	17.75	16.00	16.87	18.4	89.5	22.9	5,556
Pioneer R & G	22,975	16.50	15.00	15.75	18.1	89.7	21.9	5,114
Braune Elite	24,850	16.25	16.00	16.12	16.9	87.2	20.8	4,752
Dippe	24,500	16.75	16.25	16.50	18.1	88.2	21.6	5,268
Fredricksen	24,450	15.25	17.25	16.25	17.7	89.0	21.3	4,496
		-----	-----	-----	-----	-----	-----	-----
Maximum	24,850	17.75	17.25	16.87	18.4	89.7	22.9	5,556
Minimum	22,975	15.25	15.00	15.75	16.9	87.2	20.8	4,496
Average	24,065	16.50	16.10	16.30	17.8	88.7	21.7	5,057

"The first 30-day period in the lamb-feeding test ended yesterday, and the lambs were weighed. The gains were practically the same as in previous years, namely, about one quarter of a pound a day. The largest gain was made by the lot that was fed corn and alfalfa."

Huntley

Report for the week ending November 15

Weather conditions favored field work during the last week of October and the first two weeks of November. A light snowfall on November 13 followed by severe freezing stopped harvest operations and fall plowing. The maximum temperature recorded during the week was 71°, minimum -12, and precipitation .34 inch.

The harvest of sugar beets in the Billings factory territory is nearly completed. It is estimated that only about two per cent of the crop remains undelivered at receiving stations. Most of the amount left is harvested and in piles ready for hauling. The yield of beets in the district will average about 12.8 tons per acre, or about two tons higher than the average of the previous season. This increase in yield is attributed in part to the effect of superphosphate on a large part of the acreage and in part to a very favorable growing season. The total acreage is about 24,200; and the price received for beets \$7.50 per ton.

The farm price of alfalfa remains at about \$9.00 per ton. Most of this hay will be used locally in feeding sheep and cattle. Great Northern beans are selling at \$4.00 and \$4.25 per hundredweight, and a large part of the crop has been marketed.

All fall plowing was completed during the week. The construction of the new dairy barn and the installation of a 3-unit new type combine milking machine in the dairy are nearing completion.

Director F. B. Linfield and Dr. Howard Welch of the Montana Experiment Station visited the station during the week.

At the station the harvest of sugar beets was completed. The yields obtained in the rotation experiments are given in the following table. Yields range from 2.56 tons in rotation No. 18 to 23.38 tons in rotation No. 37.

Huntley (cont'd)

Yields of Sugar Beets
in the Irrigated Rotation Experiments
in 1930

Rotation Number	Plot Number	Y i e l d		Stand, plants per acre
		Pounds per plot	Tons per acre	
2-a	K- V- 22	4,156	8.31	25,984
10	- II- 7	10,243	20.49	25,088
18	- V- 4	1,280	2.56	22,400
20	- 6	6,701	13.40	27,328
21	- 14	9,823	19.66	23,744
22	- 8	2,588	5.18	21,056
23	- 16	9,648	19.30	24,192
30	- IV- 17	5,439	10.88	25,536
31	-III- 15	11,089	22.18	23,744
32	- IV- 20	3,919	7.84	26,880
40	- 2	2,960	5.92	23,296
42	- 8	2,350	4.70	19,712
60	-III- 12	7,536	15.07	24,640
61	- 6	8,280	16.56	24,192
67	- II- 6	8,120	16.24	24,192
2-aa	L- IV- 5	4,937	9.87	26,880
34	- 2	3,477	6.95	26,112
35	- 6	8,775	17.54	27,456
46	- 13	2,503	5.01	17,472
64	- 18	3,998	8.00	23,808
37	L- I- 1	11,689	23.38	25,728
47	- 12	10,197	20.39	25,728
49	- 5	9,375	18.55	24,192
49	- 8	11,494	22.99	24,960
Average		6,687	13.37	24,747

Dan Hansen

San Antonio

At the beginning of the three-week period ending November 1 temperatures were slightly above normal, but during the last two weeks they were subnormal. Beneficial rains on October 12, 23, and 28, added to those received earlier in the month, have "put a good season in the ground" for fall-planted crops. The precipitation during October, 4.17 inches, has been exceeded for the same month only three times in the preceding 23 years of record. A summary of the climatological data recorded for the three weeks and for the month of October follows.

Week ending	Temperature						Pre- cipit- ation*	Aspect of the sky(days)		
	Maximum		Minimum		Mean	G. D.R.		Clear	Partly cloudy	Cloudy
	Abs.	Mean	Abs.	Mean						
Oct. 18	89	81.7	54	62.1	71.9	23	.68	3	1	3
" 25	84	73.4	42	53.7	63.6	27	1.17	2	2	3
Nov. 1	76	71.4	40	50.6	61.0	28	.28	3	1	3
Mo. of Oct.	90	79.1	40	59.7	69.4	28	4.17	11	6	14

*Inches

San Antonio (cont'd)

Measurements have been made for the mapping of areas of cotton dead from rootrot for all cotton plantings on the station.

Sr. Genaro Arzave, Agronimo Regional, Direcc. Agricultura, Monterrey, N. L., Mexico, was a station visitor October 14, being especially interested in cotton rootrot and its relation to fruit and nut trees.

Other station visitors during the period were Mr. Paul R. Dawson, Associate Biochemist, Bureau of Chemistry and Soils, October 15; Messrs. Jordan and Jenkins of the same Bureau, October 20 and 21; and Mr. Eugene Eaton, Office of Cotton, Rubber, and Other Tropical Plants, October 23 to 28, inclusive.

During the two weeks ending November 15 there were almost continuous showers from the 5th to the 11th, inclusive. Notwithstanding the fact that the air was almost completely saturated during this entire time, only 1.28 inches of precipitation fell. During the night of November 13 a heavy rain occurred which added another 1.28 inches to the precipitation total for the two-week period. An abundance of soil moisture is now available.

Very little field work has been possible, although plots and fields in which winter crops are to be planted were prepared during the first part of the period.

Deep tillage with a Killifer subsoiler was accomplished on Field C-6 in connection with the cooperative rootrot experiments of the Bureau of Chemistry and Soils and the Office of Cotton, Rubber, and Other Tropical Plants of this Bureau. Two $\frac{1}{2}$ -acre plots in Field B-7, which are to be used in a test of deep tillage with corn, were also subsoiled with the same tool.

The following is a summary of the climatological data recorded during this period:

Week ending	Temperature						Pre- cipitation	Aspect of the sky		
	Maximum		Minimum		Mean, \bar{C} .			Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean	D. R.					
							inches	days	days	days
Nov. 8	79	69.7	48	51.3	60.5	28	.45	2	2	3
" 15	80	67.4	46	55.0	61.2	34	2.11	0	2	5

Messrs. Dawson and Jenkins of the Bureau of Chemistry and Soils were at the station on November 3 for the purpose of completing the subsoiling of plots in their experiment on Field C-6.

Geo. T. Ratliffe.

Scotts Bluff

The average maximum temperature for the two-week period ending November 1 was 55°, with a maximum of 70 on October 24; the average minimum was 24, with a minimum of 17 on the night of October 30. The average hourly wind movement was 6.5 miles. The precipitation amounted to only .03 of an inch, making a total for the year of 20.55 inches.

The weather conditions have been good for the harvesting of all crops. The potatoes have all been dug, and the yield was fairly good

Scotts Bluff (cont'd)

except in the sections where hail did damage. The price of potatoes has increased some; the growers are now receiving about \$1.10 per hundredweight.

The beet harvest has been conducted rather vigorously this fall, the growers remembering their experience of last fall when a large percentage of the beets were frozen in. Many have already finished, and with another week of favorable weather most of the beets will be out of the ground. The crop over the district is very good, many fields yielding more than 20 tons per acre. The sugar content has been rather below normal, but the chemists say that it is getting better as the season advances. When the last report was made it was 14.14 per cent.

At the station the harvest of beets in Field K has been completed and work has been started in Field E, which will be completed by the end of the coming week if the weather continues suitable.

The steers were brought down from the Government pasture during this period and were placed in dry lot. A summary of the results will be given in a following report. This year closed the three-year test. The steers will be fed beet tops for awhile before being marketed.

The number of lambs that will be fed in this section will be considerably below normal from present indications. A few have been shipped in at prices ranging from 5¢ to 7¢, but most of the feeders are waiting and hoping for lower prices.

Mr. M. L. Baker, head of the swine department of the North Platte Substation, was a visitor during the week.

Mr. D. E. Propps left for Fallon, Nevada, on October 26 to take up his work on the Newlands project.

The average maximum temperature for the week ending November 8 was 63°, with a maximum of 68 on the 3d and 8th; the average minimum was 22, with a minimum of 16 on the night of the 6th. The average hourly wind movement for the week was 5.0 miles. No precipitation was recorded.

The weather conditions have been ideal for the harvesting of the beet crop. Probably only 2 or 3 per cent of beets remain in the ground. In some districts the receiving stations have been closed and the piled beets are being run over the dumps. The average yield in this district is about 14.5 tons per acre—the second highest yield ever recorded. The sugar content remains low, however. It will probably be a little over 14 per cent.

At the station all the beets have been harvested, and fall plowing has been started on the plots in Fields K and E. This completes the harvesting of crops this season except for shucking out the corn, which is still in the shock on the plots.

The Superintendent's cottage is nearing completion. Painters are at work now, and the inside finishing is well under way.

The Cooperative Poultry Marketing Association received bids on about five cars of dressed turkeys on Friday. The birds were sold to the American Stores Company of Philadelphia, who offered the following prices per pound: No. 1 young toms, 28½¢; No. 1 young hens, medium grade, 26½¢; old toms, 22¢; and No. 2 turkeys, 12¢. Practically all of the deliveries graded No. 1. There will probably be a much larger number of turkeys to sell on the December market.

Scotts Bluff (cont'd)

A very small number of feeder lambs are being shipped into the valley. Few good lambs are being brought to the markets, and the assumption is that the range men are holding for higher prices. It is said that they have fixed 8¢ as the price to be obtained. A few cattle are being put into feed pens to clean up the beet tops.

James A. Holden

M I S C E L L A N E O U S

Mr. C. S. Scofield, Principal Agriculturist, who has been in the West since the latter part of September in connection with the boron investigations, returned to Washington on November 16.

Mr. Arthur T. Bartel, who has been Junior Agronomist at the Yuma Field Station since March 1929, was transferred on November 1 to the Office of Cereal Crops and Diseases with headquarters at Tucson, Arizona.

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Belle Fourche

The yields of small grains this year on the Field Station are given in the following tables.

Yields of Irrigated Oat Varieties

Variety	Yields per plot			Yields per acre				Weight per bu.
	1st	2d	3d	1st	2d	3d	Average	
	Lbs.	Lbs.	Lbs.	Bus.	Bus.	Bus.	Bus.	Lbs.
Swedish Select	65	66	65	101.6	103.1	101.6	102.1	36
Sixty Day	64	63	63	100.0	98.4	98.4	98.9	34
Gopher	73	60	62	114.1	93.7	96.9	101.6	32
Markton	74	72	74	115.6	112.5	115.6	114.6	36
Hull-less	55	54	50	85.9	84.4	78.1	82.8	36
Canadian	71	68	63	110.9	106.2	98.4	105.2	37
Silvermine	66	72	63	103.1	112.5	98.4	104.7	36
Victory	70	63	66	109.4	98.4	103.1	103.6	37
Golden Rain	75	71	64	117.2	110.9	100.0	109.4	37
Idamine	80	74	69	125.0	115.6	107.8	116.1	36
Rainbow	76	71	66	118.7	110.9	103.1	110.9	33
White Russian	56	46	45.5	87.5	71.9	71.9	77.1	35

Yields of Irrigated Wheat Varieties

Variety	Yields per plot			Yields per acre				Weight per bu.
	1st	2d	3d	1st	2d	3d	Average	
	Lbs.	Lbs.	Lbs.	Bus.	Bus.	Bus.	Bus.	Lbs.
Reward	27	24	28	22.5	20.0	23.3	21.9	63
Hope	32	33	37	26.7	27.5	30.8	28.3	56
Reliance	41	40	45	34.2	33.3	37.5	35.0	62
Marquis	32	37	41	26.7	30.8	34.2	30.6	59
Ceres	34	36	39	28.3	30.0	32.5	30.3	60
Marquillo	32	32	33	26.7	26.7	27.5	27.0	57
Supreme	36	38	37	30.0	31.7	30.8	30.8	59
Kubanka	40	48	45	33.3	40.0	37.5	36.9	62
Mindum	37	44	44	30.8	36.7	36.7	34.7	63
Nodak	46	52	47	38.3	43.3	39.2	40.3	60
Federation	34	35	36	28.3	29.2	30.0	29.2	54
Champlain	36	42	42	30.0	35.0	35.0	33.3	59

Yields of Dry Land Wheat Varieties

Variety	1st	2d	3d	1st	2d	3d	Average	Weight per bu.
Marquis	23	24	25	19.2	20.0	20.8	20.0	59
Ceres	26	28	26	21.7	23.3	21.7	22.2	58
Kubanka	27	26	30	22.5	21.7	25.0	23.1	60

Belle Fourche (cont'd)Yields of Irrigated Barley Varieties

Variety	Yields per plot		Yields per acre			Weight
	1st	2d	1st	2d	Average	per bu.
	Lbs.	Lbs.	Bus.	Bus.	Bus.	Lbs.
Minnsturdi	51	44	53.1	45.8	49.4	44
Trebi	32	75	25.4	78.1	81.7	49
Coast	68	64	70.8	66.7	68.7	42
Hannchen	54	46	56.2	47.9	52.0	49
Chevalier	58	52	60.4	54.2	57.3	46
Luth	62	54	64.6	56.2	60.4	48
White Smyrna	75	66	78.1	68.7	73.4	48
Aunless, Horsford	42	36	43.7	37.5	40.6	42
Hull-less, Nepal	46	36	47.9	37.5	41.7	55
Comfort	59	52	61.5	54.2	57.8	46
Velvet	44	41	45.8	42.7	44.2	46
Emmer, White Spring	60	40	93.7	62.5	78.1	40

Note: White Spring Emmer is figured at 32 pounds per bushel.

Sugar Beet Experiments

U. S. Belle Fourche Field Station
1926 to 1930, inclusive

Items		Yield per acre, tons					
		Average	Average	Average	Average	Average	Average
		1926	1927	1928	1929	1930	1926-1930
<u>Spacing Test</u>							
Spacing	10"	22.6	17.8	19.6	17.2	21.3	19.7
Spacing (Standard)	12"	18.3	15.9	17.4	16.0	17.8	17.1
Spacing	14"	20.1	15.7	17.2	15.2	17.6	17.2
Spacing	16"	20.5	14.5	17.3	14.8	17.8	17.0
Spacing	18"	21.5	13.2	16.1	14.2	17.0	16.4
Spacing	20"	17.6	14.0	15.0	13.6	17.8	15.6
Spacing	22"	17.1	13.4	14.1	14.5	15.6	14.9
Spacing	24"	18.2	12.7	13.0	13.1	13.9	14.2
<u>Selected Plants Vs. Not Selected</u>							
Selected	12"	21.5	15.1	15.9	14.7	18.9	17.2
Not selected	12"	21.4	14.5	13.1	15.0	16.2	16.0
<u>Time of Planting</u>							
First planting, Apr. 15	--	--	7.3	13.7	17.2	12.7	
Second " , May 1	--	--	7.1	14.3	14.3	12.1	
Third " , May 15	--	--	9.2	15.2	15.6	13.3	
Fourth " , June 1	--	--	6.4	12.4	14.4	11.1	
<u>Time of Thinning</u>							
First thinning, proper	--	15.9	15.0	17.9	18.5	16.8	
Second " , 2 weeks late	--	15.6	13.7	14.6	15.7	14.9	
Third " , 4 " "	--	13.3	8.1	10.9	12.0	11.1	

Belle Fourche (cont'd)Sugar Beet Experiments (cont'd)

Items	Yield per acre, tons					
	Average 1926	Average 1927	Average 1928	Average 1929	Average 1930	Average 1926-30
<u>Previous Crop and Land Preparation</u>						
Corn ground disked	--	16.9	--	--	--	--
Corn ground plowed	--	17.2	--	--	--	--
Beet ground disked	--	17.2	--	--	--	--
Beet ground plowed	--	15.6	13.9	--	--	--
Beet ground duckfooted and disked	--	--	15.7	--	--	--
Beet ground spring plowed	--	--	--	14.1	--	--
Beet ground duckfooted	--	--	--	12.4	--	--
<u>Shrinkage Test—Per cent of Loss at End of Five Days</u>						
Original weight .....lbs.	1,357	215	200	200	200	---
Final weight "	1,000	162	181	181	163	---
Shrinkage "	357	53	19	19	37	---
Shrinkage %	26.3	24.7	9.5	9.5	18.5	17.7

Note: The shrinkage in 1928 and the low in 1929 were due to the fact that the 5-day period was cold with temperatures below freezing every night.

Beyer Aune.

San Antonio

Field operations have been possible only four days during the two weeks ending November 29 due to frequent showers and non-drying weather. In fact so little field work has been possible throughout the month of November that we are fully two weeks behind schedule now.

The climatological summary for the two weeks and for November follows:

Week ending	Temperature						Precip- itation Inches	Aspect of the sky		
	Maximum		Minimum		Mean	G. D. R.		Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
Nov. 22	83	71.3	43	50.6	60.9	30	.80	2	2	3
" 29	74	64.7	38	40.6	52.6	30	.22	2	2	3
Month of November	83	68.1	38	48.9	58.5	34	3.58	6	8	16

The first killing frost this fall occurred the night of November 24 with a minimum recorded temperature of 28°. The frost-free period during the 1930 season was 261 days; the last spring frost having been recorded for the night of February 16. Some damage was reported from trucking areas in the vicinity of San Antonio, principally to fall tomatoes, which were later than usual this season.

Geo. T. Ratliffe.

Scotts Bluff

The average maximum temperature for the week ending November 15 was 58° with a maximum of 67 on the 13th, the average minimum was 24 with a minimum of 17 on the night of the 15th. The average hourly wind movement was 6.5 miles. No precipitation was recorded.

Good weather has continued throughout the week, and the beet harvest is completed. Later figures still show that the average yield in the Nebraska district will be about 14.50 tons per acre. Due to the rapid delivery of beets this fall, the beet payment on the 15th will be unusually large.

With the beet harvest out of the way, some of the feeders are now planning to feed lambs. A few flocks have been put in the lots at prices ranging from 5¢ to 6¢ a pound. Mr. S. K. Warrick, of the Lamb Feeders' Association, has estimated that there will be about 60 per cent as many lambs fed this year as were fed last year. As 450,000 were fed in the district last year, it is believed that about 275,000 will be fed this year.

With the last potato estimate of the Department, the price declined^{again} to its low level, and buyers are only offering 50¢ a bushel at the car door. Very few sales are being made now as the potatoes that are left in this district are in the cellars and will not be sold until spring.

The present price of hay is lower than it was last year; feeders are buying hay for \$8 per ton in the stack.

At the station the fall plowing of all plots has been completed, and the beet tops have been piled for winter feeding. The steers that were used on the summer pasture test are being fed beet tops and hay.

The Superintendent was at the Denver market the first of the week to get a car of mixed age steers for experimental feeding, but could find nothing satisfactory.

Yields of Sugar Beets, Scotts Bluff Field Station, 1930

Rotation No.	Total yield		Per cent of stand	Plants per plot	Average weight beet Lbs.
	Pounds per plot	Tons per acre			
		Field K			
2	3,403	6.81	48	3,295	1.03
18	4,853	9.71	50	3,432	1.41
20	4,447	8.89	58	3,981	1.12
21	10,600	21.20	93	6,383	1.66
22	5,799	11.60	64	4,394	1.32
23	8,454	16.91	83	5,697	1.48
30	5,000	10.00	55	3,775	1.32
31	9,717	19.43	83	5,697	1.70
32	5,609	11.22	64	4,394	1.27
40	9,533	19.07	67	4,600	2.07
42	9,045	18.09	73	5,010	1.81
45-1st year	10,070	20.14	84	5,766	1.73
45-2d year	8,089	16.18	84	5,766	1.40
60	7,098	14.20	69	4,737	1.50
61	9,379	18.76	85	5,834	1.61
62	7,149	14.30	72	4,942	1.44
64	6,968	13.94	75	5,147	1.35
71-1st year	6,420	12.84	58	3,981	1.61
71-2d year	10,089	20.18	77	5,285	1.89
Average	7,390	14.78	71	4,848	1.52

Scotts Bluff (cont'd)Yields of Sugar Beets, Scotts Bluff Field Station, 1930 (cont'd)

Rotation No.	Total yield		Per cent of stand	Plants per plot	Average weight per beet
	Pounds per plot	Tons per acre			
		<u>Field E</u>			<u>Lbs.</u>
I- 7	10,419	20.84	84	5,604	1.86
8	9,647	19.29	82	5,470	1.81
9	8,544	17.09	67	4,471	1.91
10	8,895	17.79	73	4,872	1.82
11	8,407	16.81	64	4,271	1.97
II- 7	9,401	18.80	76	5,070	1.85
8	10,796	21.59	86	5,737	1.88
9	11,959	23.92	89	5,936	2.02
10	11,553	23.11	89	5,936	1.95
11	12,518	25.04	88	5,870	2.13
13	8,492	16.98	48	3,203	2.65
15	9,926	19.85	64	4,269	2.32
19	8,258	16.52	52	3,469	2.38
33	9,829	19.66	79	5,271	1.86
41	10,238	20.48	80	5,337	1.92
43	9,508	19.02	67	4,471	2.13
46	7,184	14.37	60	4,003	1.80
46	8,920	17.84	69	4,604	1.94
47	10,368	20.74	67	4,471	2.32
Average	9,730	19.46	73	4,860	2.00

The average maximum temperature for the week ending November 22 was 37° with a maximum of 54 on the 16th, the average minimum was 21 with a minimum of 9 on the night of the 21st. The average hourly wind velocity was 11.4 miles. About six inches of snow fell on the 18th, with a measured precipitation of .3 inch. A high wind accompanied the snow and continued for a day after the snow, so that the roads have been very badly blocked and traffic was almost stopped for several days.

The work at the station has been the routine duties of taking care of the stock. During the week a shipment of cattle, consisting of ten head each of calves, yearlings, and 2- and 3-year old steers, was bought in Denver for delivery next week. These cattle will be started on test as soon as possible. They are all to be fed the same ration.

The Valley Chamber of Commerce met in Mitchell this week to take part in a valley-wide reception in honor of James T. Whitehead, R. F. Tebbets, and A. W. Mathers, who succeeded in getting the profits from the power plants on this project applied on the payment of construction charges. It is now thought that this will take care of about half the construction charges.

The price of potatoes continues to decline with none offered for sale in this district. The price of corn is also down, the cheapest it has been for many years. The station is now buying home-grown yellow corn of good quality, shelled, at \$1.05 per hundred.

Scotts Bluff (cont'd)Yields of Potatoes, Scotts Bluff Field Station, 1930

Rotation No.	Pounds per plot				Per cent of yield				Bushels per acre
	2½	2	1½	Culls	2½	2	1½	Culls	
Field K									
4	57	822	397	141	4	58	28	10	94.5
20	98	1,115	548	195	5	57	28	10	130.4
21	612	2,242	442	101	18	66	13	3	226.5
24	175	1,088	385	105	10	62	22	6	116.9
25	797	2,181	416	72	23	63	12	2	231.1
26	164	1,250	328	72	9	69	18	4	120.9
27	316	1,603	338	122	13	66	16	5	162.0
30	127	1,354	487	148	6	64	23	7	141.1
31	449	2,732	449	112	12	73	12	3	249.5
40	1,049	2,687	378	84	25	64	9	2	279.9
44	1,770	2,070	295	84	42	49	7	2	281.3
60	1,277	2,386	329	123	31	58	8	3	274.3
61	1,189	2,881	412	91	26	63	9	2	304.9
64	1,411	3,224	353	50	28	64	7	1	335.9
71	1,604	3,375	444	111	29	61	8	2	368.9
Average	740	2,067	403	107	19	62	15	4	221.2
Field E									
17	1,260	2,110	259	74	34	57	7	2	246.9
33	1,818	2,216	310	88	41	50	7	2	295.5
41	2,050	2,993	388	110	37	54	7	2	369.4
43	2,252	2,566	314	105	43	49	6	2	349.1
46	1,150	2,262	345	76	30	59	9	2	255.5
47	1,992	2,686	249	50	40	54	5	1	331.8
Average	1,754	2,472	311	84	37	54	7	2	308.0

The average maximum temperature for the week ending November 29 was 48° with a maximum of 50 on the 26th, the average minimum was 19° with a minimum of 14 on the night of the 27th. The average hourly wind movement was 8.3 miles.

At the station there has been only the routine work of caring for the stock and hauling out manure to some of the pastures and fields.

During the week the lambs that have been on test on various combinations of wheat and other grains were given a preliminary weighing to get an idea of the rate and amount of gains. They had been on feed 55 days, about 40 days being required to get them up to full feed. During this period they have made an average daily gain of about .25 of a pound, which is very satisfactory for the first half of the feeding period. They will be continued on feed about 20 more days. The gains in all lots have been remarkably uniform. Only one lamb has been lost so far. A feeder in Mitchell Valley, on the Fort Laramie unit, who has been using wheat for about 3,000 lambs has had some loss, though not yet a serious one. He has been feeding rather heavily and the loss may be due to that fact.

Scotts Bluff (cont'd)

Lambs to be fed are being brought into the valley at a little faster rate, though many of the small farmers are not bringing any in this year.

The steers that were used in the experimental work last winter and this summer were taken to farms in Mitchell Valley, and will be fed beet tops and alfalfa for a short time before they are marketed.

The local price of butterfat is now below the cost of production except in the very best herds. The price has been as low as 21¢ per pound, but it has worked back to 23. In the two lots of dairy cows in the station herd, one lot getting only roughage and the other roughage and grain, the feed cost of producing butterfat for the roughage lot is 13.1¢ and for the grain lot 20.4¢, or an average of 17.2¢ for both lots.

James A. Holden.

W E E K L Y R E P O R T S
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December 6 and 13, 1930

No. 23

Belle Fourche

The feeder lambs were weighed for the second 30-day period on December 10. The following table shows the feed, gains for each period, average gain for the 60-day period, and the average weight for each lot.

Average Weight and Gains Made by Feeder Lambs in 30- and 60-Day Periods

Lot No. and Rations	Average gain first 30 days	Average gain second 30 days	Average gain in 60 days	Avg. wt. after 60 days feeding
	Lbs.	Lbs.	Lbs.	Lbs.
Lot 1- Dry pulp	7.50	4.75	12.25	78.50
Lot 2- Dry pulp, cottonseed cake	8.33	7.97	16.30	83.25
Lot 3- Barley	5.18	10.50	15.68	81.50
Lot 4- Oats	5.50	7.50	13.00	78.50
Lot 5- Corn	10.48	8.50	18.98	85.25
Lot 6- Pressed pulp, cottonseed cake ..	8.03	4.75	12.78	78.50
Lot 7- Pressed pulp	4.75	4.50	9.25	75.50
Lot 8- Pressed pulp, molasses	6.75	6.00	12.75	79.00
Lot 9- Pressed pulp 30 days, barley and cottonseed cake to finish	3.62	7.00	10.62	78.25
Lot 10- Barley, cottonseed cake	5.85	8.00	13.85	79.00
Lot 11- Corn, cottonseed cake	9.02	10.92	19.93	85.75
Lot 12- Corn, linseed meal	9.90	10.00	19.90	84.50
Lot 13- Dry pulp, barley, cottonseed cake	5.05	10.25	15.30	83.00
Lot 14- Dry pulp, linseed meal	8.28	3.75	17.03	82.75
Average weight	---	---	---	80.95
Average gain per head	7.00	7.80	14.80	---
Average daily gain .....	.23	.26	.25	---

Note: The death loss to December 10 has been three, two being in Lot 11 and one in Lot 2. In each instance substitution has been made, using extra lambs purchased from the Experiment Farm. No more extra lambs are available.

Beyer Aune.

Huntley

Report for the week ending December 13

Weather conditions continue to be favorable for field work, and farmers have been able to do more than the usual amount of fall plowing after completing the beet harvest. The open, late fall has made it possible to utilize fully the beet tops and stubble pastures and to save a large amount of winter feed. The maximum temperature during the week covered by this report was 60 and the minimum 13; no precipitation was recorded.

Huntley (cont'd)

Alfalfa hay is selling at \$10 per ton and is being hauled loose by truck to feed yards at Billings.

Final deliveries of sugar beets are being made from storage piles at receiving stations. The supply is sufficient to keep the factory in operation until about January 15. The average yield of beets on the Huntley Project is reported to be more than 14 tons per acre.

Maximum Crop Production Experiment

An experiment to determine means of producing maximum crop yields has been under way in Field O-I since 1926. In this work it has been the aim to embody in one cropping series such cultural methods as have been observed to be conducive to high yields in the irrigated rotation experiment and in other cropping work at the station.

The field contains 11 one-fourth acre plots. Seven crops of local importance are grown in the series. These are alfalfa, sugar beets, corn, potatoes, oats, wheat, and beans. A more or less definite rotation, or rather a combination of two rotations, has been followed although slight changes have been made at various times. During the years 1928 to 1930, inclusive, five plots in the series were cropped to alfalfa. Two of the alfalfa plots were plowed up each year, one followed by corn and the other by potatoes. Oats followed corn, and beans followed oats. Beets were grown after potatoes and wheat after beets. For the cultivated crops, manure was applied at the rate of 16 loads per acre before plowing. For the grain crops and alfalfa, the land was not plowed but was prepared by disking only and no manure was applied. In 1930, for the first time, treble superphosphate was applied at the rate of 100 pounds per acre to beets, wheat, and oats at the time of seeding. Superphosphate was applied also to the third-year alfalfa.

The yields obtained in the experiment during the five-year period are given in the following table.

Yields of Crops in Maximum Crop Production Series,
1926 to 1930, inclusive

Crop	Unit of yield	Yields per acre					
		1926	1927	1928	1929	1930	Average
Alfalfa	Ton	---	5.86	5.88	5.92	6.98	6.16
Corn	Bu.	72.5	65.7	69.2	60.4	60.0	65.6
Potatoes	Bu.	490.6	560.0	492.6	563.7	336.0	488.6
Oats	Bu.	92.5	121.2	136.3	128.7	121.6	120.1
Beets	Ton	22.34	22.00	22.00	19.96	24.51	22.16
Wheat	Bu.	---	---	65.3	58.0	76.6	66.6
Beans	Bu.	---	---	48.3	48.9	42.7	46.6

Dan Hansen.

San Antonio

The first half of the two-week period ending December 13 continued cloudy and showery and no field work was possible. Temperatures remained close to normal throughout the period and no freezing weather occurred.

Fall plowing was resumed the first of the second week and continued without interruption. Fields C-4 and D-4 were put in condition for planting, and the small grain variety test was seeded on the north 400 feet of C-4. Seven varieties of wheat, four of oats, and four of barley were included in the test. Oats in the rotation experiment emerged to satisfactory stands.

The climatological data recorded during the two weeks are summarized below.

Week ending	Temperature						Precip- ita- tion	Aspect of the sky		
	Maximum		Minimum		G. D. R.	Mean		Clear	Partly cloudy	Cloudy
	Abso- lute	Mean	Abso- lute	Mean						
Dec. 6	73	63.6	33	42.0	28	52.8	Inches .55	Days 2	Days 3	Days 2
" 13	72	65.4	39	42.6	28	54.0	tr.	2	2	3

Dr. Cook and Mr. Findlay, of the Office of Cotton, Rubber, and Other Tropical Plants, spent December 9 at the station. Messrs. Dawson and Jenkins, of the Bureau of Chemistry and Soils, plowed a portion of their experiment on Field C-6 with a Killifer chisel on December 12. Mr. Atkins, formerly assistant superintendent here, now in charge of wheat improvement in Texas for the Office of Cereal Crops and Diseases, with headquarters at Denton, Texas, returned December 8 to assist in working up data recorded at this station during the past season.

Geo. T. Ratliffe.

Scotts Bluff

The average maximum temperature for the two-week period ending December 13 was 49°, with a maximum of 58 on the 9th; the average minimum was 19, with a minimum of 14 on the night of the 12th. The average hourly wind movement was 5.5 miles. There was a light snowfall on the night of the 16th amounting to about an inch with a measured precipitation of 0.03 inch.

The weather conditions have remained favorable during this period. A few more feeder lambs have been shipped in, and the early estimate of 60 per cent of last year's feeding operations has just about been fulfilled. It is noticed, however, that a rather large percentage of this number consists of lambs shipped in by growers and commission companies. These lambs are being fed under the supervision of local men. Most of the small feeders are staying out of it this year.

The Superintendent made a trip to Denver and bought a carload of light lambs to start on the regular feeding test that is carried on each winter. This is the second year of the test in which the following rations will be used, the amounts given being the daily feed for lots of 25 lambs:

Scotts Bluff (cont'd)

Lot 1.	32 lbs.	corn, alfalfa
" 2.	16 "	corn, 16 lbs. pulp, alfalfa
" 3.	10 "	corn, 22 " pulp, alfalfa
" 4.	4 "	corn, 28 " pulp, alfalfa
" 5.	16 "	barley, 16 lbs. pulp, alfalfa
" 6.	16 "	corn, 16 lbs. pulp, beet tops, alfalfa
" 7.	16 "	corn, 16 " pulp, 6 lbs. cake, beet tops, alfalfa
" 8.	16 "	corn, 16 " pulp, 6 " cake, beet tops, alfalfa
" 9.	16 "	barley, 16 lbs. pulp, 6 lbs. cake, alfalfa
" 10.	32 "	pulp, 10 lbs. cake, alfalfa
" 11.	32 "	pulp, 8 " cake, alfalfa
" 12.	32 "	pulp, 4 " cake, alfalfa
" 13.	32 "	pulp, 2 " cake, alfalfa

The steers that were run in dry lot last winter and on grass the past summer have been put in feed lots and are being fed beet tops and alfalfa hay. The feed lots at the Station are being cleaned out in preparation for a carload of calves that have been ordered and will go on test as soon as received.

The 13 lots of lambs that have been fed during the past 70 days on varied combinations of wheat and other home-grown grains were finished and sent to market at the end of the period. In response to an invitation, quite a number of the feeders of the valley came in and inspected the lambs on December 12. The lambs had been appraised by a local feeder, and the results of the feeding operations were prepared in mimeographed form, which has been mailed to the feeders of the valley. Most of the lots were highly finished even though on feed such a short time and had made very satisfactory gains. The results, based on the appraisal on that day, showed a small gain.

Scotts Bluff (cont'd)

Summary of Lamb Feeding Test, Scotts Bluff Field Station

(25 Lambs per Lot; Fed 70 Days, from Oct. 1 to Dec. 10, 1930)

Lot Number	1	2	3	4	5	6	7
Daily rations for 25 lambs	Corn, 38 lbs.	Corn, 32 lbs. Cake, 6 lbs.	Wheat, 16 lbs. corn, 16 lbs. cake, 6 lbs.	Wheat, 12 lbs. corn, 20 lbs. cake, 6 lbs.	Wheat, 12 lbs. corn, 10 lbs. barley, 10 lbs. cake, 6 lbs.	Wheat, 12 lbs. corn, 10 lbs. pulp, 10 lbs. cake, 6 lbs.	Wheat, 8 lbs. corn, 8 lbs. barley, 8 lbs. pulp, 8 lbs. cake, 6 lbs.
	alfalfa	alfalfa	alfalfa	alfalfa	alfalfa	alfalfa	alfalfa
Initial weight of lamb lbs.	67.4	67.4	67.4	66.8	67.0	67.0	67.2
Final wt. of lamb "	84.9	87.7	88.2	86.9	88.1	83.5	87.9
Gain per lamb "	17.5	20.3	20.8	20.1	21.1	21.5	20.7
Avg. daily gain per lamb "	.25	.28	.28	.28	.30	.30	.28
Feed required per 100 lbs. gain:							
Wheat "	--	--	166	120	116	114	85
Corn "	358	340	165	232	106	104	84
Barley "	--	--	--	--	106	--	82
Pulp "	--	--	--	--	--	104	80
Cake "	--	60	60	61	58	57	59
Alfalfa "	532	567	573	474	480	524	560
Corn silage "	203	175	171	177	163	165	152
Cost per lamb @ \$7.00 per cwt. \$	4.72	4.72	4.72	4.68	4.69	4.69	4.70
Feed cost per lamb \$	1.13	1.53	1.45	1.38	1.32	1.43	1.40
Interest and ship- ping charge \$	.55	.55	.55	.55	.55	.55	.55
Total cost of lamb \$	6.40	6.80	6.72	6.61	6.56	6.67	6.65
Appraised value of lamb \$	3.15	8.25	8.25	8.25	8.25	8.25	8.25
Value of lamb after deducting 6 pounds shrinkage \$	6.43	6.74	6.73	6.67	6.77	6.81	6.76
Profit or loss per lamb ..... \$	.03	-.06	.06	.06	.21	.14	.11
Feed cost per 100 pounds gain \$	6.48	7.56	6.97	6.88	6.25	6.65	6.75

Feed costs: Wheat \$16.00 per ton, corn \$22.00 per ton, cake \$40.00 per ton,
barley \$14.00 per ton, pulp \$20.00 per ton; alfalfa \$8.00 per ton.

Scotts Bluff (cont'd)

Table continued from preceding page

Lot Number	8	9	10	11	12	13
	Wheat, 32 lbs.	Wheat, 16 lbs.	Wheat, 12 lbs. barley, 20 lbs. cake, 6 lbs.	Wheat, 12 lbs. barley, 10 lbs. pulp, 10 lbs. cake, 6 lbs.	Wheat, 16 lbs. pulp, 16 lbs. cake, 6 lbs.	Wheat, 12 lbs. pulp, 20 lbs. cake, 6 lbs.
Daily rations for 25 lambs	alfalfa	alfalfa	alfalfa	alfalfa	alfalfa	alfalfa
Initial weight of lamb lbs.	67.6	67.4	67.4	67.6	67.6	67.6
Final wt. of lamb .. "	86.6	86.5	86.3	86.7	86.9	86.9
Gain per lamb "	19.0	19.1	18.9	19.1	19.3	19.3
Avg. daily gain per lamb "	.27	.27	.27	.27	.27	.27
Feed required per 100 lbs. gain:						
Wheat "	363	181	129	128	179	137
Corn "	--	--	--	--	--	--
Barley "	--	180	236	116	--	--
Pulp "	--	--	--	116	174	231
Cake "	64	64	65	65	63	63
Alfalfa "	585	631	563	546	542	564
Corn silage "	186	184	188	186	184	184
Cost per lamb @ \$7.00 per cwt. \$	4.73	4.72	4.72	4.73	4.73	4.73
Feed cost per lamb .. \$	1.31	1.32	1.25	1.31	1.35	1.39
Interest and shipping charge ..... \$	.55	.55	.55	.55	.55	.55
Total cost of lamb ... \$	6.59	6.59	6.52	6.59	6.63	6.67
Appraised value of lamb \$	8.15	8.15	8.10	8.20	8.25	8.20
Value of lamb after deducting 6 pounds shrinkage \$	6.57	6.56	6.50	6.62	6.67	6.63
Profit or loss per lamb \$	-.02	-.03	-.02	.03	.04	-.04
Feed cost per 100 pounds gain \$	6.91	6.90	6.62	6.84	7.02	7.22
Feed costs per ton: Wheat \$16, corn \$22, cake \$40, barley \$14, pulp \$20, alfalfa \$8.						

James A. Holden

Yuma

Report for the month of November

The maximum temperature for the month of November was 93°, mean maximum 79.8, minimum 30, mean minimum 44.2, mean for the month 62.0. Although a minimum of 32° was recorded on the 15th, very little frost injury was noticed on the cotton and other summer crops until the heavy frost on the 20th. The frost-free period for 1930, from February 25 to December 15, is 262 days.

Yuma (cont'd)

Rain occurred in nearly all sections of the southwest at some time during the month. The precipitation locally was extremely light. A trace fell on the 4th, 15th, and 27th, and .03 of an inch was recorded on the 28th.

The weather has been unusually good during the cotton picking season. The project ginning report from the eleven operating gins shows 21,193 bales ginned for the period ending December 4. The fields have been pretty well picked over. Stalk cutting and plowing have been started in the lower Yuma Valley.

Prices for alfalfa hay and seed have remained low for the past two months. Seed is being held in the warehouses for better prices. Present quotations are around 16 cents for both Peruvian and Common varieties.

Station work for the month included construction on the new cotton gin building and a two unit guest cottage; picking cotton, ginning cotton; harvesting corn and grain sorghums; planting alfalfa, wheat, and barley; cutting the sixth crop of alfalfa hay; general ditch cleaning, weeding, and irrigating.

Mr. J. S. Townsend, of the Office of Cotton, Rubber, and Other Tropical Plants, has been here since October 1 installing the cotton ginning machinery.

J. E. Hite and R. E. Blair were station visitors on November 17.

E. G. Noble.

M I S C E L L A N E O U S

THE SALT BALANCE OF THE YUMA VALLEY

Introduction

During the year ending September 30, 1930, a record has been kept of the quantity and salt content of the irrigation water delivered to farms in the Yuma Valley and of the water removed through the drainage system. This record makes it possible to compute the total tonnage of salt carried into the valley by the irrigation water diverted from the Colorado River, and the total tonnage removed in the drainage water. Furthermore, it is possible to compute the tonnage of each of the salt constituents determined by analysis and consequently the annual balance for the area with respect to each constituent.

Under existing conditions it is not practicable to determine the total net quantity of irrigation water diverted into the canal system of the Yuma Valley. The best information obtainable is based on the sum of the reported deliveries of water to farms. These measurements do not include the water lost from the canal system by percolation. Most of this percolation loss passes into the underground water and is subsequently removed as drainage. Consequently the salt content of water lost by canal seepage is not included in the total given for the tonnage of incoming salt. Also it is probable that the actual quantities of water delivered to farms is somewhat larger than is charged in each instance, since ditch riders tend toward liberality in such measurements.

Salt Balance of the Yuma Valley (cont'd)The Irrigation Inflow

For the year ending September 30, 1930, the total volume of irrigation water delivered to farms in the Yuma Valley was 100,453 acre-feet, as reported by Mr Priest. This irrigation water was sampled each week throughout the year, and the samples were analyzed at the Limoneira Laboratory. These analyses included a measurement of the specific electrical conductance ($K \times 10^{-5}$ at $25^{\circ} C.$) and the determination of the following ions: HCO_3 , Cl , SO_4 , Ca , and Mg together with the computation by difference of the alkali bases sodium and potassium (AB). During part of the year the analysis also included the determination of the total dissolved solids based on the evaporation at 110° of a filtered aliquot.

It is possible to estimate approximately the total salt content of irrigation^{water} in either of three ways: (1) From the specific conductance; (2) from the sum of the ions determined, including half the bicarbonates; or (3) by weighing the residue from the evaporation of a filtered aliquot. In the present study only the first and second of these methods were used. In computing salt content from specific conductance the method here used was to multiply the figure for specific conductance of the irrigation water by the factor 6.5 and taking the result as parts per million. The result obtained by this method showed a total salt burden for the year of 98,685 tons in the 100,453 acre-feet of irrigation water or slightly less than one ton of salt per acre-foot. The total salt content as computed from the sum of the ions was 96,146 tons.

The Drainage Outflow

The drains of the Yuma Valley lead to a sump at the International Boundary at the south end of the project where the drainage water is pumped over a protecting levee into Mexico. At this pump it is possible to measure accurately the volume of discharge. This volume for the year ending September 30, 1930, was 49,158 acre-feet. In other words, the difference between the volume of irrigation water delivered to the farms and that discharged as drainage was 51,295 acre-feet. The total irrigated area was about 43,000 acres.

The drainage discharge was sampled each week throughout the year, and the samples were analyzed at the Limoneira Laboratory by the same methods as were used for the irrigation water. The total salt burden of the drainage outflow as computed from the specific conductance (factor 7.0) was 98,398 tons or approximately two tons of salt per acre-foot of water. When computed from the sum of the ions, however, the total was 85,020. This difference is a matter of interest and will be discussed later. There are good reasons for accepting the larger of these two totals as being nearer the truth. In either case it is evident that the outflow of salt in the drainage water is approximately equal to the inflow in the irrigation supply, or, in other words, that the salt balance of the valley is not seriously adverse.

Salt Balance of the Yuma Valley (cont'd)The Salt Balance

The analytical data available make it possible to compare the irrigation inflow and the drainage outflow with respect to each of the six major salt constituents as well as with respect to the total salts. From these data the annual tonnage of each constituent may be computed for the irrigation water on the one hand and for the drainage water on the other. Thus for the bicarbonate (HCO_3) the annual tonnage in the irrigation water was 12,075 while that ² of the drainage water was 10,579, a difference of 1,496 tons. For the chloride (Cl) the inflow was 11,472 tons and the outflow was 25,035 tons. In other words, the drainage water carried away from the valley 13,563 tons more chloride than was brought into the valley by the irrigation water. Of the sulphate (SO_4) the irrigation water brought in 41,622 tons while the drainage water took away 20,075 tons, leaving a residue of 21,547 tons. The calcium (Ca) in the irrigation water amounted to 12,150 tons with 9,273 tons in the drainage, leaving a residue of 2,877 tons. The magnesium (Mg) content of the irrigation supply was 3,990 tons and that of the drainage 3,458 tons, a residue of 532 tons. Of the alkali bases (AB) the tonnage in the irrigation supply was 14,917, with 16,600 in the drainage water. Thus for this constituent, probably largely sodium, the outflow exceeded the inflow.

These comparisons show that with respect to chloride the balance for the valley was distinctly favorable, since more than twice as much was carried away as was brought in. The same favorable balance is shown in the case of the alkali bases, though the difference is not so great.

It is evident that the salts of higher solubility, the sodium and magnesium chlorides, pass through the soil and out with the drainage more readily than do the salts of low solubility, the calcium sulphates and bicarbonates. These salts of calcium are not harmful in the soil because they are precipitated from the soil solution before the concentration becomes high enough to be injurious to crop plants. The indications are that the Yuma drainage system is functioning adequately to remove not only all of the harmful salts of high solubility brought in by the irrigation water, but also is removing some of those salts that had previously been deposited in the valley soil.

The following tabulated statement shows, in acre-feet and in tons, quantities of water, of total salt and of salt constituents in the irrigation and drainage water of the Yuma Valley for the year ending September 30, 1930.

<u>Item</u>	<u>Irrigation</u>	<u>Drainage</u>	<u>Difference</u>
Acre-feet of water	100,453	49,158	51,295
Total salt by conductance, tons	98,685	98,398	287
Bicarbonates (HCO_3), tons	12,075	10,579	1,496
Chlorides (Cl), ² tons	11,472 ³⁹²	25,035	-13,563 ⁶⁴³
Sulphates (SO_4), tons	41,622	20,075	21,547
Calcium (Ca), tons	12,150	9,273	2,877
Magnesium (Mg), tons	3,990	3,458	532
Alkali bases (AB), tons	14,917	16,600	- 1,683
Total ions determined	96,146	85,020	11,126

W E E K L Y R E P O R T S
Of the Office Of
WESTERN IRRIGATION AGRICULTURE

Vol. XXXII December 20 and 27, 1930 and January 3, 1931 No. 24

Belle Fourche

On December 18 the members of the Western South Dakota Lamb Feeders' Association made a tour of the project, visiting many of the lamb feeders and also inspecting the several lots on feed at the Field Station. Some 20 cars and 50 people made up the delegation.

The weather has been unusually good this month.

The Superintendent spent some time in the Washington office during December.

Beyer Aune.

San Antonio

Report for the three-week period ending January 3

Although no unusually low temperatures were recorded for the latter part of December, the mean remained below normal with the result that small grains and flax in the rotations and varietal tests have been slow to emerge and have made very little growth. With the exception of two days the maximum temperature was below 60° throughout the entire period. The minimum to date, 23°, occurred the night of December 16. The meteorological data recorded for the three weeks and for the month of December are summarized below:

Week ending	Temperature					G. D. R.	Pre- cip- ita- tion Inches	Aspect of the sky		
	Maximum		Minimum		Mean			Clear Days	Partly cloudy Days	Cloudy Days
	Abso- lute	Mean	Abso- lute	Mean						
Dec. 20	75	59.4	23	33.7	46.6	38	.02	2	5	0
" 27	62	54.7	26	33.7	44.2	28	.35	1	3	3
Jan. 3	68	56.4	30	36.3	46.4	32	.02	0	3	4
Month of Dec.	75	59.9	23	38.3	49.1	38	.94	7	13	11

Rainfall was light and scattered, although the humidity was relatively high during December, and the soil moisture supply remained ample for the needs of winter crops.

A comparison of five flax varieties planted in triplicate 1/30 acre plots and the first plots of a time-of-seeding flax test were planted December 15 in fields C-4 and D-4, respectively. North Dakota Resistant No. 114 and Rosquin were the two varieties used in the time-of-seeding test.

Approximately 8½ acres included in portions of fields A-7, B-7, and C-7 were seeded to Hairy Peruvian alfalfa December 17. Germination was slow owing to the low temperature of the soil, but good stands have now emerged. Although this land has been cleared for many years, it has never previously been used for a planted crop.

Oats were planted December 18 on about 3½ acres of the portions of fields B-3, C-3, and E-3 which are unsuited for experimental purposes.

San Antonio (cont'd)Climatological Review of 1930

The year 1930 began with rather open weather and normal temperatures, although the latter part of the preceding month had furnished a severe norther during which a minimum of 10° was recorded. Small grains made fair recovery from the effects of this freeze during the first two weeks of January, and flax was planted the first of the month under favorable conditions. About the 14th temperatures began a general descent and remained subnormal to the end of the month. The absolute minimum for the period— 9° above zero—occurred on the night of the 17th. This equalled the all-time record for the station. The temperature was not only unusually low, but remained so over a longer period than is customary. Five nights the minimum went below 20° , and killing frosts occurred fourteen nights during the month. The mean temperature for January, 41.8° , was 10° below normal and 3.2 lower than was ever before recorded for the month. A measurable quantity of rain fell on fourteen days, and only six days were recorded as clear. The weather was generally disagreeable throughout the month, and outdoor work was impracticable most of the time.

Small grains suffered severely from the January freeze and stands were greatly reduced. No winter pasturage was available. Canadian field peas were killed 100 per cent. The flax variety and time-of-planting tests planted January 2 were just emerging when the freezing weather arrived and the entire planting was destroyed. The flax nursery was planted January 3, and all plants which had emerged by the time the hard freeze occurred were killed; however, some varieties and strains, and a few seeds of most all varieties, were slower in germinating and were able to emerge later. A second planting of the flax variety test made February 7, and subsequent plantings in the time-of-planting test, produced satisfactory stands.

Many of the less hardy perennial plants of the San Antonio region suffered severe damage from the freeze. Washingtonia robusta palms, which had suffered the loss of their older leaves in the December freeze, were either completely killed or lost all their leaves. Most Phoenix palms—dactylifera and canariensis—were killed. The Sabal and Erythea palms suffered the loss of their older leaves but none were completely killed. The privets (Ligustrum spp.) were damaged according to the individual vigor of the specimens, some weaker ones being killed, others losing their leaves and young wood, and the stronger ones being practically undamaged. Many of the native Huisache (Vachellia Farnesiana) trees were completely killed, although the majority were only killed to the ground. San Antonio is approximately on the northern limit of this species. Meyer lemons and Satsuma oranges had been banked with soil and their tops wrapped in sorghum stalks. When these were later uncovered they were found to have been killed down to the soil. Sour oranges froze to the ground and the citranges suffered varying damage. Some Rusk and Savage citranges were as badly damaged as the sour oranges while other specimens of these two varieties suffered only the loss of their leaves and more tender young wood. Two of the Rusk variety flowered late and set and ripened a small crop of fruit in the fall.

San Antonio (cont'd)

Contrasting with January the mean temperature for February was 5.4° above the average mean for this month for the preceding 23 years. This high mean was the result of uniformly high minimum temperatures rather than any extraordinarily high maximums. A minimum as low as 32 was recorded for only one day. The month was deficient in sunshine and although threatening weather predominated, only 0.76 inch of precipitation was recorded. March temperatures were low and the mean for the month was 5.1° below normal. The soil was colder at the time of planting spring crops than for any other season during the past ten years. Corn planted February 25 required fourteen days to emerge, and early growth was correspondingly slow. Sunshine was deficient in March and sixteen days were recorded as cloudy and only nine as clear. Precipitation, which fell mostly in small showers on nine different days, was about normal for the month.

Temperatures were normal throughout April, and all crops made good growth until near the end of the month when small grains were suffering for moisture except on the better class soils. From March 27 until April 25 only small, scattered showers of no agricultural value had occurred. A total of 1.66 inches of rain fell from the 25th to the 28th of the month, which relieved conditions temporarily. Many small showers were received during May, measurable quantities of rainfall being recorded for ten different days, but none were of value. No rain was received during the first ten days of June, and all crops were in need of moisture. Small grains and flax had matured during the drought and yields were lowered appreciably. Threshing was mostly completed before rain came in June and although yields were low, the grain was clean and bright. Test weights were low. Corn was suffering from lack of moisture at time of tasseling and earlier prospects for bumper yields were blighted. Early grain sorghums headed just after the middle of May without damage from the midge but with visible signs of distress from moisture deficiency.

Rainfall occurring from June 11 to 15, inclusive, amounted to 3.44 inches and was of real benefit to all crops. No more rain of consequence fell until July 9 when 2.54 inches were recorded. This was the last effective rainfall received until the first part of October. Cotton, which had put on a heavy crop of bolls and in June promised an exceptionally good yield, shed a large percentage of the crop and the final result was a yield barely above normal. Only one picking was obtained. Only a fair first crop of hay sorghum was obtained, and the second crop growth burned out entirely. Cowpeas grown for green manure made good early growth but burned dry before the fall rains started in October.

Failure to receive beneficial rains in September created a serious shortage of fall pasturage and feed crops. Preparation of fields for early seeding of winter crops was also delayed. Beginning October 3 a period of frequent showers and non-drying weather began which lasted, with a few brief interruptions, throughout the first week of December. Oats in the rotations were planted on November 21 and 26, but the planting of the small grain and flax varieties was delayed until the middle of December. Some plowing scheduled for November was not completed at the close of the year.

San Antonio (cont'd)

Temperatures during the last eight months of the year stayed relatively close to normal with no excessively hot weather in the summer months nor any low extremes in the fall and early winter. The last spring frost occurred the night of February 16 (minimum 32°) and the first killing frost in the fall was recorded the night of November 24 (minimum 28°), giving a frost-free period of 281 days, which is comparable with the average for the preceding 23 years of 259 days.

At the close of the year the weather was favorable for field work, small grains were in good condition, and there was sufficient moisture in the soil for the immediate needs of winter crops.

Geo. T. Ratliffe.

Scotts Bluff

The average maximum temperature for the week ending December 20 was 34° with a maximum of 43 on the 16th, the average minimum was 9 with a minimum of 3° on the night of the 17th. The average hourly wind movement was 5.8 miles.

The work at the station has been routine, such as caring for stock and hauling out manure. The weather conditions are ideal for feeding, and the lambs are doing well. A few more lambs have been shipped in, but it is probable that all that are to be fed during this winter have been received.

Conditions among the dairy farmers continue to grow worse. Cream has reached the lowest level ever known at this season of the year; it is bringing only 20 cents per pound of butterfat. In many cases, in fact in most cases, it is below the cost of production, which may result in disaster to some of the dairymen. They are meeting the depression by drastic culling out of low producers. Fourteen were culled from the herds of the Association last month.

Poultrymen are also having their troubles, although the price of eggs has not dropped so low here as in some other sections. Within about three weeks the price has declined from 42 cents to 27 cents per dozen.

Beet growers are in the most favorable position this winter. The yield of beets was good; and as the banks through the past season were very cautious in extending credit, the beet growers find themselves with more of the money received for beets than is usually the case. This has made business very good for the merchants of the valley.

The average maximum temperature for the week ending December 27 was 40° with a maximum of 48 on the 23d, the average minimum was 11° with a minimum of 7° on the nights of the 21st and 26th. The average hourly wind movement for the week was 6.0 miles.

Weather conditions have remained favorable throughout the week. The temperature for the month will probably be considerably above the normal for December. It is ideal weather for livestock feeding.

At the station the routine work has been carried on. During the week the corn plots were husked out and the yields were as follows:

Scotts Bluff (cont'd)

Rotation No.	Pounds per plot	Bushels per acre
26	478	27.3
16	500	28.6
6	392	22.4
32	666	38.1
62	<u>1168</u>	<u>66.7</u>
Average	641	36.6

The prices of all farm products are depressingly low. Feeders are buying wheat for 80 cents per hundred, barley for 70 cents per hundred, and corn for about \$1.05 per hundred. Alfalfa hay is reported as selling for \$5 and \$6 per ton in the stack. Cull beans are also being used by some lamb feeders. These beans carry about 18 per cent protein and can be bought for about 50 cents per hundred, making a very cheap protein feed. Sheep, however, are the only live-stock that will eat them.

Butterfat is down to 20 cents per pound, and eggs have been quoted as low as 19 cents per dozen. In spite of these low prices, merchants in the valley have had a very good trade during the holidays, and there seems to be the usual amount of prosperity on the project.

The average maximum temperature for the week ending January 3 was 46° with a maximum of 50 on the 2d; the average minimum was 13 with a minimum of 7 on the night of December 30. The average hourly wind movement for the week was 4.4 miles.

The total precipitation for the year was 20.88 inches; the yearly average is 15.05 inches.

The average maximum temperature was considerably above the average for the last ten years, which was 38°. The average minimum was just about normal. The mean temperature for the month was 4.5° above the average for the ten years but was 2° below the mean for December 1929. The temperature was very uniform throughout December; it was the first time since 1912 that zero temperatures have not been recorded during that month, the lowest being 3° above zero.

During the week only routine work has been carried on at the station. A bulletin on the results of the lamb-feeding operations has been prepared and the manuscript forwarded to Lincoln. Field data for the past year are being assembled and reports are being prepared.

James A. Holden.

Yuma

Report for the month of December

The maximum temperature for the month of December was 77°, mean maximum 69.1, minimum 24.0, mean minimum 34.5, mean 51.8 (this was 5.7° colder than December 1929). No precipitation was recorded.

During the winter of 1929-30 freezing weather was reported on three days in November, three in December, five in January, and one in February—a total of twelve cold days for the winter. For the

Yuma (cont'd)

winter of 1930-31 there were three cold days in November and twelve in December. A cold period has prevailed throughout the Southwest since December 18. Some damage to citrus trees has been reported from the Salt River Valley and Wellton Mesa in Arizona and from the San Joaquin and Imperial Valleys in California. As yet there has been very little frost damage on the Yuma project.

The total rainfall for the year 1930, as reported at the office of the Weather Bureau in Yuma, was 1.79 inches. This is 1.69 inches below normal. The gauge readings of the Colorado River as recorded at Yuma show that the discharge for December was 222,000 acre-feet. This is the lowest for 28 years. The average for the month since records have been taken is 520,100 acre-feet.

The twelve gins on the project had ginned 26,489 bales by December 31. Although the weather has continued to be favorable for picking cotton, the last part of the crop has moved in from the fields very slowly. In many cases late pickings have been sacrificed on account of the low price of the lint and the desire to make early plantings of alfalfa or grain on the cotton lands.

Station work performed during the month included the finishing of the cotton gin and guest house buildings, extending sewer lines, picking and ginning cotton, planting alfalfa and winter grains, general hoeing, cultivating, and irrigating.

Mr. H. L. Westover, of the Office of Forage Crops and Diseases, was a station visitor on December 17 and 18. Mr. Frank A. Thackery, of the Office of Horticultural Crops and Diseases, visited the station on December 30.

E. G. Noble.

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